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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLIII. No. 2889.] LONDON, SEPTEMBER 24, 1918. [70TH YEAR. PRICE 6d.

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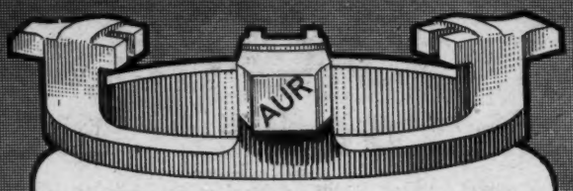

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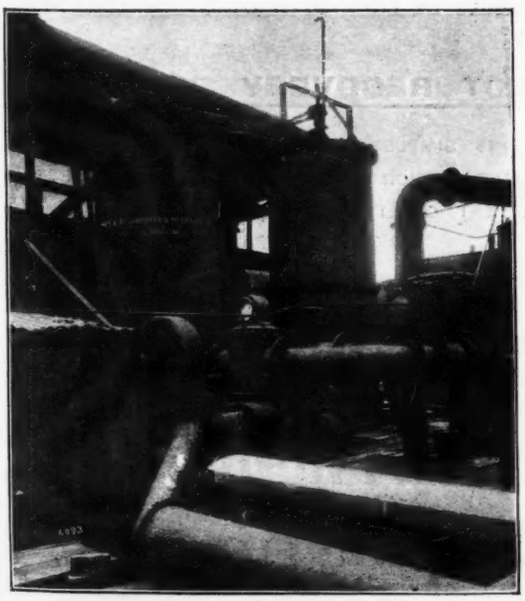

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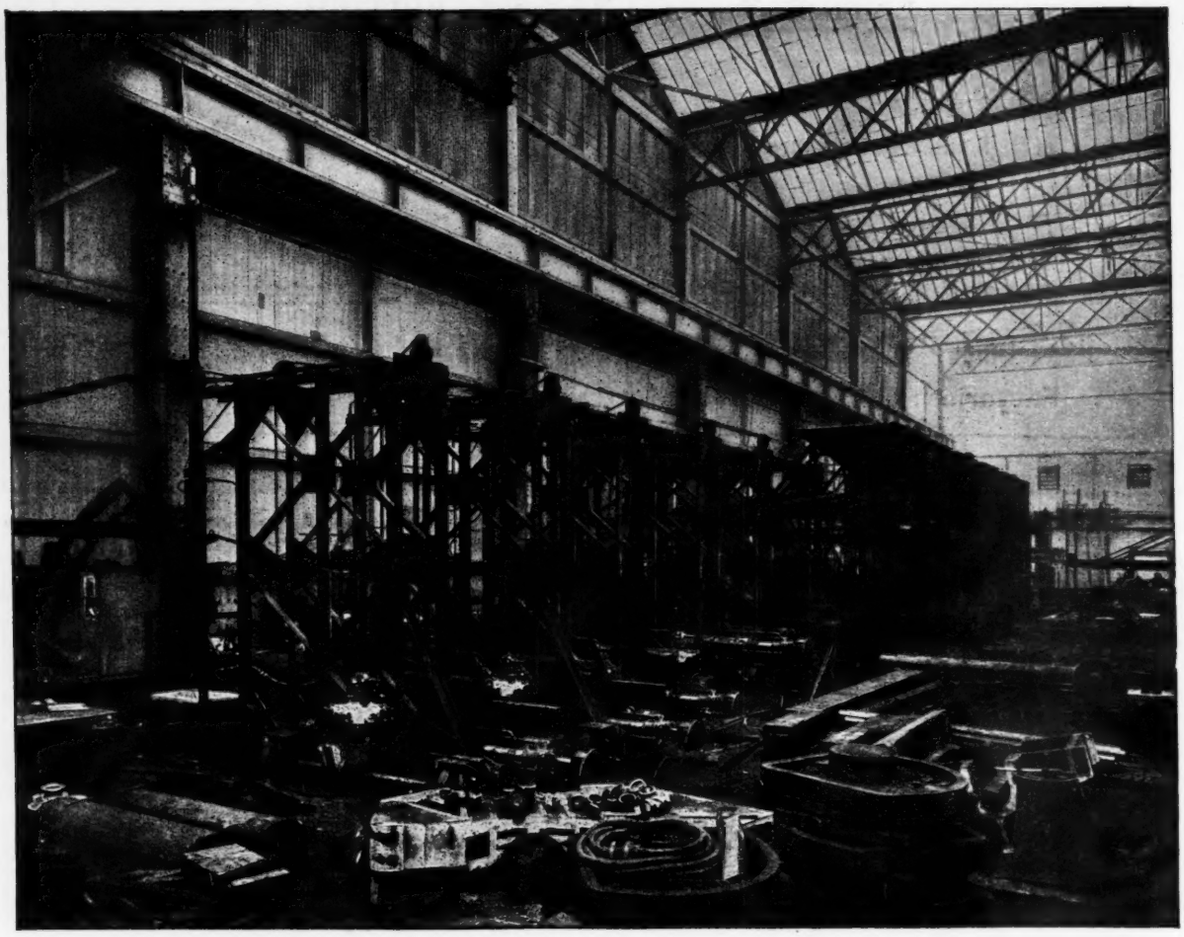

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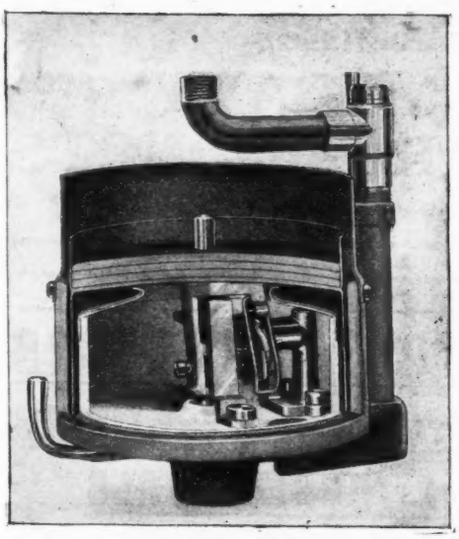

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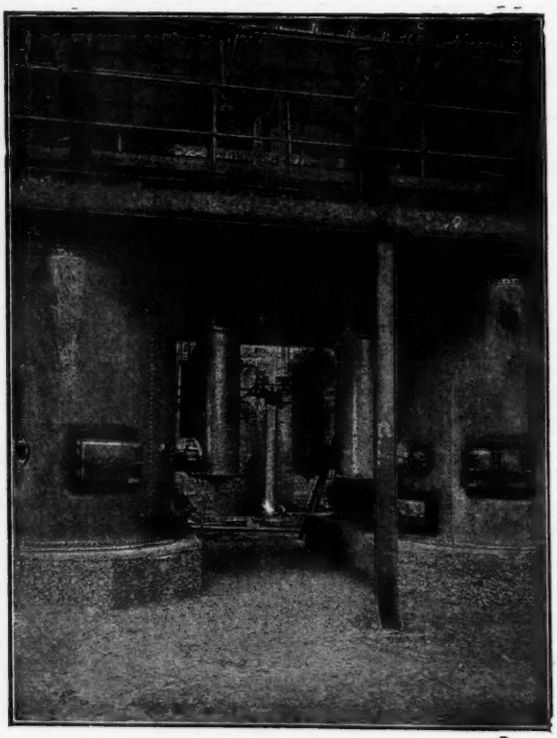

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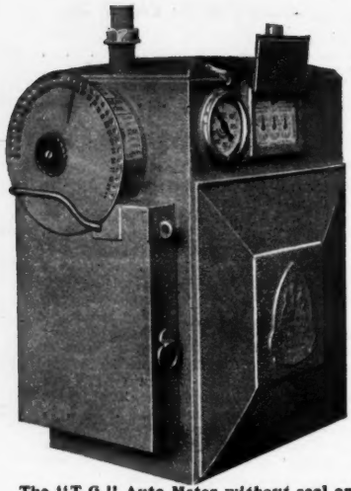

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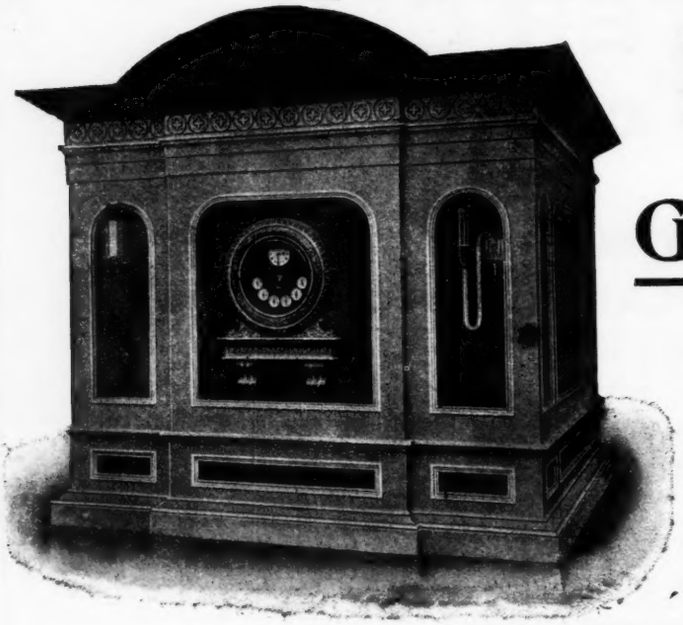

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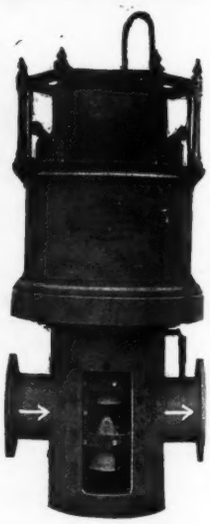

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EDITORIAL NOTES.

Sir Albert Stanley's Appeal—Gas Allowance per Ton.

IT is inevitable that we shall have to go through a very severe winter in regard to coal supplies. These are the warning words to which Sir Albert Stanley, the President of the Board of Trade, gave utterance at a conference (reported in our news columns to-day) at the Mansion House last Friday. The objects of the conference were to furnish the facts as to the causes of the shortage of coal, and to enlist the sympathy of all present to do a part in disseminating the information, so that the fuel and lighting rationing scheme may be regarded as a necessary evil, or rather in a favourable light, by every responsible person, whether in the household or in industry, in order that every pound of coal possible may be saved. In short, the President urgently invites every person, within his or her individual sphere, to become a fuel and light controller. The object is a very worthy one; and the regret is that dark, stormy weather and low temperatures have come thus early to buffet the strenuous endeavours that are being made to ease the situation to the largest possible extent. Sacrifices and efforts have to be made not only in the national, but in the allied interests; and every man and woman must do his and her share, through fuel and light use, in the work of economy—thankful that home circumstances are not as those in France and Italy; thankful, too, to be of some service in alleviating the lot of the people of France and Italy, whose conditions in regard to fuel, bad as they have been in past war winters, will be intensified in the coming one. We will leave for perusal by our readers Sir Albert Stanley's statement, with its arguments and its figures, showing causes of shortage and problems to be faced. The statement was made with a gravity that cannot be imported into cold print; and when Sir Albert said that what has to be done is to weigh victory against comfort, then every man, woman, and child of sufficient intelligence to appreciate will cheerfully forgo a part of normal comfort and convenience in order to win in the great conflict with murder, rapine, barbarity, foulness, dishonour, which are among the courses deliberately chosen by the Prussians in trying to secure for the German Empire world domination.

But leaving the general position for a couple of points in the statement and reply to the discussion. Sir Albert was asked why, in view of the large number of American soldiers who have been transferred across the Atlantic to France, a sufficient number of British miners could not be released from the Army so as to rectify the shortage of coal output to meet requirements. The reply of the President was plausible, but not convincing. It was in effect in two parts. The first was that what America was doing in sending her man power to the Front does not justify us in weakening our own contribution to the fighting forces. The second was that it is estimated that America will have to suffer a deficiency between coal demand and output of no less than 75 million tons; and therefore we cannot expect America to suffer this while we are withdrawing from our forces sufficient men to maintain our own standard of comfort and to meet fully our own requirements. But surely the conditions are not comparable. Coal, the President said, is essential to victory. Granted. This country has alone to bear an exceptional strain to secure victory through coal—a strain that is not falling upon America. The case put forward by Sir Albert warrants our saying this. We have to find coal for France and Italy, the coaling of the ships that are bringing the American troops over is largely done here, and in exchange for the ships loaned to us for conveying the American troops coal is being supplied to neutral countries. These are all excess demands upon our resources due to military necessities and happenings; and therefore there is very good reason why these military necessities should be met by military means. Judging by the figures and the arguments advanced by Sir Albert, we cannot admit any great hopefulness that the 20,000 men who are being drafted-back from the Army to the mines will be able, even with all possible coal consumption economies, to satisfy this rationed country, our Allies, neutral countries, and the additional ship coaling resulting from the war.

Again Sir Albert was asked by two or three speakers (whose inquiries were endorsed by many voices) why a larger allowance was not made to householders than 15,000 c.ft. in exchange for a ton of coal, in view of the fact that the carbonized ton of coal gives, besides the gas, half a ton of coke and other valuable products. Sir Albert's reply was of a threefold character. If (to put his points concisely) provision could be made at the gas-works to deal with the extra coal, if regard had not to be paid to the character of the coal required for gas making, and if supplying sufficient coal to meet the present gas allowance was not already placing a tremendous strain upon the railways, owing to the considerable depletion of the rolling stock and the necessity that had arisen for transferring to other directions the ships hitherto engaged on coal traffic to London and the South, then most probably it would be quite wise to make a more generous allowance of gas in exchange for coal. From this it would appear the main bar to a higher allowance than 15,000 c.ft. is the question of transport. We quite admit that Sir Albert Stanley and Sir Guy Calthrop cannot work impossibilities. But it is a fair thing to ask them why, if transport is a bar to a higher allowance than 15,000 c.ft. of gas per ton, 800 units of electricity were allowed per ton of coal, which require (taking the average consumption of coal per unit throughout the country for generating purposes) no less than an average of 1½ tons of coal, which is completely destroyed, and does not leave in the locality ¾ ton of coke for fuel, as would be the case if the same 1½ tons were carbonized at the gas-works? If Sir Albert can afford to give electricity users, under conditions of transport, the product of 1½ tons of coal per ton relinquished, then he could give to gas consumers the product from 2¼ tons, which would be equal to the 1½ tons *plus* the ¾ ton of solid fuel locally remaining from its carbonization. The 800 units, the complete destruction of the coal used in the production of electricity, the coke and other products remaining from coal carbonization, are all witnesses that there has been preferential consideration paid to electricity stations in connection with the conditions of transport. And the gas industry feels that no satisfactory explanation has been given of the allowance awards under such opposite conditions in view of the need for economizing coal use and relieving the strain on transport. Yet we add our voice to the appeal of Sir Albert for fuel economy.

Policy Problems.

IN his Presidential Address to the North of England Gas Managers' Association last Saturday, Mr. Norman S. Cox, of Sunderland, covered much ground by short, quick steps; but, after the historical prelude is past, we find a shrewd appreciation of the needful policy which must govern the gas industry of the future. From the very nature of things that obtain in the industry—the diversity of its manufacturing and sale interests—its policy must be constructed of several parts; but all parts must have the similarity of progressiveness. The problem is a great one; but this fact is

one reason why it should be taken in hand resolutely and systematically, just in the same way as a valuable piece of highly refined research. Those who read Mr. Cox's address with this aspect of the matter well in mind will gain most from its perusal.

In one place, the President deplores the fact that, though Sunderland is so close to coal sources, deliveries have of late left much to be desired in the matter of quantity and quality. The gas industry has had a vast experience now of what this means in the production of industrial uneconomy and the weakening of industrial stability; and it can perhaps more than any other of the large industrial users of coal produce the evidence which shows that the further one can practically recede by reversal from the present conditions, the greater the economy to the nation. This is one direction in which the Government should see that their reconstruction policy penetrates. It is a basic necessity; and one of the lessons of war time will be lost if it is not recognized to be so. We pass from this to another part of the address; and there is the reiteration of what all now accept as an absolutely certain condition of the future. On every hand, war time bonus allowances to workers have been consolidated into wages, other than percentages that have been specifically marked by those whose ruling cannot be ignored. The Trade Unions are intending to use their power to protect and to retain, on the return of peace, much of what has been gained for labour. Politicians, economists, social reformers, and many others, and not a few employers, are agreed that the standards of pay can never return to their old levels. This applies equally to the gas industry as to other businesses. Application outside the industry means, without any other considerations, a general enhanced cost of the materials and goods required by it. Here comes an important part of the problem. In conjunction with these permanently higher costs, the gas industry knows that it must provide a cheaper heating gas. Of this it has to convince the powers that be, on the grounds of national interests and the preservation of the industry, which is one of those industries that the Premier has indicated must be preserved, as contributing largely to defence and internal progress. The production of more gas per ton of material used—gas of good flame-temperature-producing value, if not of high calorific power per cubic foot consumed in a calorimeter—will help to break-down the costs per unit of production. But economy must be sought for elsewhere. Again the address mirrors directions. More expensive labour must understand that higher working efficiency is required. It may sound a bit unbenevolent, but it must be realized at once by labour that with higher wages employers must—there is no help for it—pick and choose the most efficient and intelligent, so as to bring the highest possible efficiency to bear upon the work, and to gain the largest possible output per head employed. There is not the slightest doubt that higher payments to workers in industry will attract better class men from employment carrying lower values. Another method of obtaining contribution to greater production per head is by the extended application of mechanical operation, which tends to increase in efficiency with (contrary to labour) lower costs. Everything has to be made more productive. Greater economy per unit of output is, in a word, vital to the gas industry.

At the time war broke out, the gas industry had never had stronger demand than then for gas for domestic purposes; and never prior to the war had it had the like of industrial demand that it has had since. But these facts have led some to stabilize their ideas as to requirements on the gas conditions that already exist. Those who look beyond hear, through these facts, the call for gas that can be used still more freely for heating purposes of all kinds, and at a cost that will make its appeal more effective than anything that has been offered before. Mr. Cox points to the enormous scope of business that is available if only the industry realizes, and is prepared to grasp to the fullest extent, its possibilities. The industry has yet to learn the full strength of its resources; and it has also to learn more of the methods whereby it can make the best use of these resources. The President speaks of the normal need for stimulating coke. Who can say that the best was done for coke before the war? While war conditions have favoured its disposal, the mountains of coke that had prior existence are memories that charge the industry with an indolence in effort to make the best use of its first-placed secondary product. It had never to any large extent compassed such an ideal as cultivating business in coke the same as in gas—inducing, for instance, the owners of steam-boilers to have them converted where necessary so as to be in the position to use coke in place of raw coal to the financial advantage which war time has abundantly proved, or to branch-out as suppliers of industrial gas produced from coke mixed perhaps with cheap slack, under ammonia-recovery conditions, for engine, furnace, or boiler use. So far as coke was concerned, the old creaking wheels turned with monotonous regularity in the well-worn ruts. Let there be no mistake. We have, if we would live and progress, to bring to credit every economy, and make the maximum profit from every commodity capable of yielding by whatever means.

There is also the question of benzol recovery. Mr. Cox is hopeful of this as a profit-bearer, if only naphthalene troubles arising from it can be overcome. Sunderland has had a bad experience in this connection; but, as the President does not go into details as to the steps taken to overcome the difficulty, it can be passed by with the remark that, since the Institution of Gas Engineers issued their brochure in 1917, there has been much less heard of this difficulty; in fact, the trouble has been considerably diminished, taking the country through. In view of this, the explanation of the continued difficulty at Sunderland in somewhat acute form must apparently be looked for in local conditions. There is a better outlook for tar through the agreement with the tar distillers; and tar must not again be allowed to sink to the low revenue-yielding value that was formerly its lot. Speaking of sulphate of ammonia, here the problem is how to get as large a yield (and as economically) as possible, so as to make the maximum out of this product, while, beating-up against active and new competition, the price per ton may have to be reduced. Mr. Cox mentions with some amount of pleasure that farmers are satisfied as to the enormous advantage to be obtained by treating land scientifically; but there is no assurance in this fact that sulphate of ammonia derived from coal carbonization is going to retain the custom of the farmer if he finds nitrogenous manures that will fit his soil equally well, and pocket even better.

However, what it comes to is that the problem for the gas industry is to adapt its multiplex operations—technical and commercial—to its new conditions and business openings, and to compel improvement to course along every channel. Until all this is done, the industry will not be making the best use of its opportunities, or be faithfully acquitting itself in respect of its responsibilities.

Qualified Legislators for Public Utility Concerns.

THE proposal that an Electricity Commission should be established in this country, to undertake the legislative and governmental functions associated with the electricity supply industry, invests with renewed interest the general subject of the delegation to such bodies of the power of Parliament or of Government Departments in relation to public utility concerns. A scheme of this kind if adopted for one industry will not stop there. Proof of satisfactory operation will mean its extension. Hence the interest that will be found this "side" in the outline of the address published in later columns which Mr. Walton Clark recently delivered to the Section of Public Utility Law of the American Bar Association, on "The Relation of Public "Service Commissioners to the Gas-Consuming Public and "to the Gas Companies." The lecturer does not reproach the Commissions of the States with anything that they have done, or have left undone; his sole object being to give them some ideas that the gas industry holds as to the obligations of such bureaus to the public and to the gas companies, and as to the proper methods of procedure on which regulations should be developed. The avowal of this being the purpose of the address clearly points to a defect in the constitution of such Commissions. For the legislative and governmental work associated with public utility concerns, Commissions of the kind are very right and proper. But when the chief legislative assembly delegates to such bodies its powers in respect of public service undertakings, there should be some certainty that the Commissioners themselves are fully competent and qualified to perform the work; and thus be an improvement for the objects of legislation and control. An ideal condition would be that no man, whether a lawyer or member of any other profession, should occupy the position of Commissioner until he had spent some time gaining experience in the actual work of every department of the class of public utility concern in connection with which he is to be called upon to legislate.

Improvement in the legislative machinery should begin at the bed-plate. If the qualification of the Public Service Commissioners included personal practical experience such as we have indicated, there would have been no need for Mr. Walton Clark's address, because, although he avoided criticism to any depth of past doings, actually the whole address constitutes an indictment as to incomplete personal knowledge and in some respects defective method.

This is perfectly transparent. The lecturer mentions the purpose for which the Commissions were established—viz., to secure to the public good gas service at a reasonable price, and to the investor a profit that will pay a fair return upon his investment, and will induce the present and other investors to place, as necessary, more money in the concern. But what has been on this side the attitude of Parliament and in the States of the Commissioners—more so the former than the latter? The only interpretation that can be put upon many of their actions has been that they have allowed —sometimes mistakenly—the balance to go down heavily in favour of the consumers, to the disadvantage of the investors. This is bad legislation. There is nothing judicial about such procedure. Unless protection is given without prejudice, as much to the investor as to the public, the concern must suffer in the long run—particularly in its credit. Legislatures, like municipal authorities, have almost persistently overlooked the fact that their business is to see that all conditions are such as to permit the development of public utility undertakings on lines that will promote the best public service. To do otherwise is to misconceive both obligations and functions. Legislative errors have not only been in connection with finance, but in relation to standards. And it is particularly in this direction that more flexibility is required in the proceedings of those who legislatively govern gas-supply concerns; and this flexibility can only be brought about by personal knowledge, which in turn can only be gained by intimate association with the work. This has been peculiarly obvious in the matter of the fixing of calorific standards. Through incomprehension, the philosophy of legislators and commissioners does not extend higher than the belief that the best service is gained for the consumer by the numerical greatness of the standard. The economy of production does not count, nor does the question whether there is greater compatibility between methods of use and a high or reasonably low standard. Knowledge as to how to secure high-flame temperatures under the conditions of use is not regarded as part of the necessary equipment of those who are called upon to fix standards; and they have failed to grasp the information acquired in latter years as to this and cognate subjects—such as the necessity of also framing standards with a view to economy in relation to the use of the most available materials. The result of legislative inefficiency in this respect can only be (unless accidentally otherwise) waste. This is the direction in which we can see that the best improvement can be effected in legislative work in connection with technically based industries—in ensuring that the Commissioners themselves are made more efficient by personal experience gained in the departments of the particular public utility concerns with which they have to deal. Gas engineers have to be trained for their work; the men who make the laws governing their work are not. This is an anomalous condition which advancing enlightenment ought to correct, and ought to assure that the correction proceeds with equal steps with the changes of the times.

However, Mr. Walton Clark in his address takes things as they exist. He lays down general principles which should be applied in the legislative and governmental work of the Commissions so as to ensure a continuance of equal justice as between the consumers and investors in public supply undertakings, and to place and maintain the undertakings in the soundest possible position for public service. We will give America credit for having realized to a greater depth than our Legislature has done that gas undertakings are part of the national equipment, especially in war time, and that whatever the time—be it peace or war—the same principles of equity should apply. American gas men have seen how equity has broken down on this side in connection with the dealings of Parliament with gas-works undertakings. This is not likely to occur in America. It is there realized that the values under which gas prices and investment interest were regulated do not now exist, and that whatever revision of prices takes place in order to ensure for investors during the war their fair interest, must have regard to the values that now exist. We are confident that, when appeal is made to the State Commissions, they will realize this without any prolonged argument, and that their verdict on the appeal will not be such that they will be written-down as "fools" by financiers in the States.

Opportunity of Labour, and the Certain Reaction.

THE trade unionists of the country are feeling their strength, and the blood is coursing warmly through their veins. Unions have had to be recognized, even by Departments of State. The Government have conceded to members of many unions nearly everything for which they have asked in the way of wage revision; and the Joint Industrial Councils that the Whitley Committee have recommended, the Ministries of Reconstruction and Labour have countenanced, and the Government are strongly in favour of, have impressed the unions with their own importance. We are not saying this in any sarcastic mood, because it will be a pleasure if any workable scheme can be devised in industries well organized in regard both to employers and employed which will give labour a greater interest in the industrial welfare of the country, which will energize their co-operation, and which will promote peaceful relationships, a give-and-take attitude, and careful consideration of all matters that have hitherto been the subject of more or less arbitrary demand, friction, and militant action. Coincidently with the growth in strength of the unions, there have been developed new aspects of unionism—unauthorized strikes, and rebellion against the advice of elected leaders, by the rank-and-file of the unions. Examples of unauthorized strikes are found in the short stoppages a fortnight ago of certain of the gas workers in and about London over the question of the employment of a few non-union men whom the unionists wished to compel to join their Union, on the ground that they were securing benefits derived from the operations of the Union, but were not contributing to the funds. As was pointed out last week, the gas companies concerned had no objection to their men all being members of the Union, as a large majority of unionists and a handful of non-unionists only mean friction, though British fair play should allow men perfect freedom of action in this as in other political matters. Moreover, compulsory membership does not make a unionist of a man. "He that complies "against his will, is of his own opinion still." And not being trade unionists at heart, they will desert from the ranks at the earliest possible opportunity.

However, the unauthorized strike, and the by-passing of leaders by the rank-and-file, receive strong condemnation in the recently issued quarterly report of the General Federation of Labour Unions, which also gives a grave warning to trade unions as to the reaction that will take place on the change in economic conditions with the restoration of peace. In the want of discipline, the magnifying of misunderstandings into grievances, and the stoppages that have taken place during the war when amicable settlement might have been realized, the Federation finds influences that will do much to alienate from the unions public sympathy, and build-up general hostility. We are afraid the mischief has already been done; and the most effective amends that can now be made is for the members of the trade unions to show, while the war continues, that they respect law and order in their organized state just as much as the best of citizens do law and order in ordinary communal life. Otherwise the damaged credit of the unions will of a surety lead to unhappy times for them. The Federation, it is also seen, recognizes that wages are in many directions being paid that are beyond the economic value of the labour expended, and that the enforcement of the level to which wages have ascended has only been made possible by shortage of labour. These truths will not be very welcome to those who, in their temporary strength, have been the leaders in high-handed action, and who will be sent by the general members right-about-face as soon as the conditions alter which will undermine their power. They will find that the durable gains of unionism are those that have been secured by legitimate method, and not those that have been forced, over and above what is fair in the circumstances of the times, by the aid of the weapon supplied by scarcity of labour, and which gains have helped to raise the prices of commodities to the community generally. "Whatever the trade union "movement is or possesses, is due to organization, and not "to anarchy."

The reference to the Whitley Committee scheme allows mention to be made here of their final report to the Prime

Minister. The Committee have sown their proposals; and now that the Ministries of Reconstruction and Labour have heartily taken up the matter, the Committee themselves cannot see that anything is to be gained by prolonging their own existence. In this farewell report, however, they once more submit the urgency of the problem, and the pressing need for every organized industry to equip itself with representative machinery capable of dealing with large questions of common interest to employers and employed. There is one thing we regret to see; and it is that, on the question of the adoption of schemes of profit-sharing and co-partnership, the Committee have, on the consideration of the evidence at present available, come to the conclusion that it does not justify them in putting forward any general recommendations. Those who have given longer and more intimate study to co-partnership than the Committee can possibly have done, and who have knowledge of the living benefits, will find themselves unable to agree with the somewhat abrupt method of discharging co-partnership as a valuable means to precisely the same end as Joint Industrial Councils are destined to serve, and a means that enables employees to have a rooted interest in the business for which they work. It will be absence of this rooted interest that will cause Joint Industrial Councils to have less stability than co-partnership. Even if the Committee could not have found ground for "general" recommendations, they might have gone part of the way, and advised co-partnership as a healthy policy where it could be suitably applied.

Advise Your Puzzled Consumers.

Those gas companies who have not done their part in advising householders as to how to divide their requisitions for fuel should do so at once, both by direct and indirect means. It is not too late. In some districts, householders have not received the F.H.F.3 forms. In other districts, householders are still puzzling their brains as to how to apportion the fuel allotment, which is governed by the number of rooms they fortunately or unfortunately possess, and ignores the number of mouths that have to be fed and bodies that have to be warmed and washed, and for which clean surroundings are essential. A London correspondent calls attention to a very practical piece of work the Aldershot Gas Company have been doing by circularizing householders, and publishing as advertisements in the Local Press illustrations of how fuel requirements should be divided for houses containing different numbers of rooms. The circular and the advertisements are worthy examples for other gas undertakings; and so in another part of this issue we reproduce, on a much diminished scale, one of the advertisements, as well as the circular. In addition to what the gas undertakings do in local papers, the "B.C.G.A." are arranging for instructive advertisements in suitable papers throughout the country. From what has been learned from different sources, apathy—which means want of imagination and initiative—will lose some gas undertakings a large amount of business. In certain districts, the coal merchants have been very active in getting (through the rationing scheme) householders to abandon gas for coal, despite the advice of the Coal Controller that, where there are gas appliances, gas should be preferably but economically used. And some gas engineers in their efforts to get extraordinary allowances of gas per ton, are simply playing into the hands of the coal merchants, who advise householders that, on the showing of gas men, the gas allowance falls far short of the heating capacity of coal. Enthusiasm under certain conditions may be very much misplaced.

Evading the Price of Coal Limitation Act.

The Coal Controller has made no secret of the fact that, on satisfactory evidence as to the Price of Coal Limitation Act being evaded, proceedings would be taken against the offenders, and salutary penalties be enforced, combined with which would be the ignominy of exposure. The New Moss Colliery Company and Messrs. H. S. Higginbottom and Co. have been charged at Liverpool on fourteen informations with having sold coal in 1917 at prices above the statutory limit. It was stated that, on one transaction of 30,000 tons, the illicit profit was estimated as being £9750. But, on the other hand, it was contended that the Company would have a claim against the Coal Controller in respect of loss on working as compared with the previous twelve months, of something like £37,000. Though this may be so, it is no justification for illicit profits on certain transactions; and it may be taken for granted that there was very good certainty before proceedings were initiated as to the ground for them being safe. It seems that Mr. Higginbottom was warned in 1916; but, apparently, this did not have much effect. It is unlikely that Mr. Higginbottom will in future ignore the Act; and he will have something to do to erase the effects of the terms in which he was convicted. The Stipendiary Magistrate (Mr. Stuart Deacon) said plainly that much of the evidence given by Mr. Higginbottom (who was responsible for not only his own acts, but for those of the Company, of which he was substantially the owner) was untrue, and that he had systematically and deliberately paid no attention to the provisions of the Coal Prices Limitation Act. Between them the Company and Mr. Higginbottom have to pay £1847 in fines, and £1000 costs. Perhaps the example and the plain speaking will act as deterrents to other collieries and dealers who may have been indulging in like infringements of the Act.

Clinker and Ash in Fuel.

An article in the September Engineering Supplement to "The Times," on the subject of present-day palliatives for clinker and ash in fuel, opens with the statement that at the outbreak of war a coal containing so much as 12 p.ct. of inert constituents was considered to have reached the limit of permissible impurity; but that since then dirt in progressively larger percentages has made its appearance, with the result that many of the gas-works found their best varieties containing a normal proportion of 20 p.ct., and electricity undertakings reported up to 30 p.ct. of ash. The writer draws attention to the various methods employed for curtailing the labour entailed in removing large and hard masses of clinker—namely by (*a*) machines which have for their object the cutting-away of the mass by means of a power-operated tool; (*b*) self-clinkering grates which automatically break-up and throw-out the clinker, and with which no labour at all is required; and (*c*) specially constructed grates which are not dependent upon any form of power, and which aim at precluding any formation of clinker whatever—the inert constituents coming away in the form of dust or small friable lumps, which may be removed from time to time by the lightest form of labour—in fact, by women. Most of the devices specially referred to have already been described in the pages of the "Journal."

Cost Accounts and Efficiency Methods.—A course of lectures on this subject is to be given, upon consecutive Wednesday evenings beginning Oct. 9, at the London School of Economics and Political Science (University of London), Clare Market, Portugal Street, W.C. The subject on Oct. 23 will be "Costing as Applied to Gas Undertakings," by Mr. Edward Cooke, Accountant to the City of Birmingham Gas Department, with Captain R. S. Hilton in the chair.

Progress of Applied Chemistry.—The Society of Chemical Industry announce that the second volume of reports on this subject is in the press and will be published shortly. The book will contain some 520 pages, and be divided into twenty sections. The following among other subjects will be dealt with—the authors' names being appended: Plant and Machinery (J. W. Hinchley); Fuel (J. S. S. Brame); Gas, Destructive Distillation, and Tar Products (E. W. Smith); Mineral Oil (W. J. A. Butterfield); Colouring Matters and Dyes (G. T. Morgan); Acids, Alkalis, Salts, &c. (H. A. Auden); Refractory Materials, Ceramics, and Building Materials (W. J. Rees); Metallurgy of Iron and Steel (C. O. Bannister); Metallurgy of Non-Ferrous Metals (G. Patchin).

Effects of Chlorine in Tar Distillation.—Figures have been communicated by Mr. L. Crawford to the "Chemical Trade Journal" for the purpose of inducing others to come forward with their experience as to the correlation between the chlorine percentage and the corrosion of the still domes and other parts of tar-distillation plants. He analyzed seven tars from various types of carbonizing plant. The chlorine percentages ranged from 0·0053 up to 0·148. In one case 0·226 p.ct. of chlorine was found, though the bulk sample did not contain more than 0·111 p.ct. Mr. Crawford does not consider that these and other observations and experiments of his extending over more than a year, justify him in drawing any general conclusions; but a percentage of 0·1 of chlorine in tar seems the safe maximum.

Kingzett's "Chemistry for Beginners."—The fact that two editions of this little book were published last year, and a third has been called for, testifies to its fulfilment of a popular demand. The third edition differs from the second only by the addition of of an entirely new part of 60 pp. descriptive of chemical apparatus and experiments. It should help the beginner who has not access to a fully-equipped laboratory and staff to carry out the practical experiments without which any knowledge of chemistry is but an empty husk. The descriptions are good, although we could wish that what purports to be a "fish-tail" gas-burner had not developed a batswing flame in the illustration given on p. 159. ["Chemistry for Beginners and School Use," by C. T. Kingzett, F.I.C., F.C.S., &c. Third edition; 211 pp. London: Baillière, Tindall, and Cox; 1918. Price 2s. 6d.]

PERSONAL.

Mr. PETER MACDOUGALL, who is at present at the Grimesthorpe works of the Sheffield Gas Company, has been appointed Manager and Resident Engineer to the Annfield Plain and District Gas Company.

A specially designed barometer in carved oak, with a brass plate bearing the inscription, "In Appreciation of Many Acts of Kindness shown to the Employees," was presented to Mr. C. S. SHAPLEY, on his relinquishing the position of Engineer and Manager of the Southend Gas Company to succeed Mr. W. B. Leech at Leeds. The gift was handed to Mr. Shapley by the oldest works' employee, Mr. R. Culham, who wished Mr. Shapley every success in his new sphere. Mr. Shapley responding, said he felt leaving them very much, for they had all been good friends to him. He felt that the gift marked the good feeling that had always existed among them.

OBITUARY.

ARTHUR ANDREW.

After fifty-one years of service, Mr. Arthur Andrew retired in May last year from the position of General Manager of the Oldham Corporation Gas and Water Departments. This step was necessitated by continued ill-health; and unhappily he has not lived very long to enjoy his leisure, for he died, at Chadderton, at the age of 65 years, last Saturday week.

He was only thirteen years old when he entered the service of the Corporation as an office boy, with a wage of 4s. per week. But by 1874—that is to say, in eight years—he had risen to the position of head clerk and accountant in the gas and water offices, and in 1885 was appointed cashier. On the death of his brother in 1894, he succeeded him as Superintendent of the two departments—becoming General Manager later, on the decease of Mr. John Chadwick. His health began to fail in 1915; and in the following year he received a great shock, when his only son, Lieutenant Andrew, was killed.

On more than one occasion the pages of the "JOURNAL" have borne testimony to the great esteem in which Mr. Andrew was held by his fellow townsmen and colleagues, and to the high appreciation by the members of the Corporation of the wholehearted services rendered by him over so long a series of years. At the end of 1906, when he had completed forty years' work for the Corporation, he was presented with a silver tea service, subscribed for by his colleagues, and handed to him at a gathering presided over by Mr. Tim Duxbury (the Gas Engineer), who declared that Mr. Andrew was an honest, straightforward, and conscientious official—a conviction which was heartily endorsed on behalf of the Gas Committee and the Water Committee. Again, when his resignation was intimated at a Council meeting, the Chairmen of both Committees spoke warmly of all he had done for the departments; and a Joint Committee meeting placed on record "its high appreciation of the earnest, conscientious, and faithful manner in which he has discharged the important and responsible duties that have devolved upon him during the fifty-one years of faithful service with the Corporation." The resolution of the Council recording acceptance of the resignation and appreciation of Mr. Andrew's half-century of service, was embodied in a handsomely engrossed and illuminated address; and the chief officials presented him with a silver fruit stand.

The burial was on Thursday, at St. Matthew's Churchyard, Chadderton. Mr. Andrew leaves a widow and one daughter.

Tar for Road Purposes.

In their eighth annual report, the Road Board say that attention was drawn in the previous report to the deterioration of the roads in Great Britain by reason of the shortage of labour and materials on the one hand, and the increase of heavy motor traffic directly and indirectly connected with military movements on a large mileage of roads on the other. This deterioration has continued through 1917. Defence of the Realm Regulation 9GG was issued; and under this the Road Stone Control Committee, composed mainly of experienced road engineers, was appointed. Later, it became necessary to limit and control the supplies of tar for road purposes; and an Order was made by the Minister of Munitions, which came into operation on Oct. 1, 1917, the practical effect of which was to prevent any tar (crude or dehydrated) being used for road purposes without a permit. The Board were requested by the Explosives Department of the Ministry of Munitions to administer the Order so far as the highways of the country were affected. A bulk allocation of 52 million gallons of tar was made to the Board for the twelve months ending Dec. 31 next, for highways purposes. This quantity was subsequently reduced to 47 million gallons, in consequence of a variation in the specification of the tar which permitted an increase in the percentage of oils in it. The Board have allocated the tar among the highway authorities and others for use under permits on highways of national importance, within the limits of the supplies available.

PROPOSED TAR SCHEME—THE MEETING AT NEWCASTLE.

WITH regard to the proposal to hold meetings at various centres to consider the new tar sale and purchase scheme, a meeting was held at Newcastle-on-Tyne as arranged last Saturday morning. It was very well attended by representatives of gas undertakings. Representatives of coke-oven interests, and of tar-distillers in the neighbourhood were also present. The draft scheme was fully explained by Mr. H. E. Ibbs, and a discussion followed, in which several of those present took part. The meeting thoroughly acquiesced in the principle of the scheme, and passed a hearty vote of thanks to Mr. Ibbs for journeying so far to explain it.

STATUTORY UNDERTAKINGS (TEMPORARY INCREASE OF CHARGES) ACT.

Further List of Applications.

SINCE the publication of the list in last Tuesday's "JOURNAL," the following further applications have been made under the Statutory Undertakings (Temporary Increase of Charges) Act:

Board of Trade.

Brockenhurst Gas Company.
Chew Magna Gas and Coal Company.
City of Chichester Gas and Coal Company.
Godstone Gas Company.
Herts and Essex Water-Works Company.
Llynvi Valley Gas Company.
Ogley Hay and Brownhills Gas Company.
Tipperary Gas Company.
Truro Water Company.
Wollaston Gas, Coal, and Coke Company.

NATIONAL GAS COUNCIL.

A DEPUTATION, introduced by Mr. A. E. Broadberry (and consisting of the following gentlemen), appeared before Captain H. C. Wright, representing the Controller of Coal Mines, at the Holborn Viaduct Hotel on Tuesday last, to discuss the terms of the proposed "Coke Prices Order, 1918." The Council have been informed that the issuing of the Order will be postponed for the present.

Name.	Undertaking.	Name.	Undertaking.
H. O. Carr	Wandsworth	W. G. S. Cranmer	Willenhall
F. W. Cross	Lea Bridge	T. H. Duxbury	So. Shields
C. Valon Bennett	Rochester	J. L. Langford	Coventry
S. H. Jones	Commercial Gas Co.	A. Stokes	South Metropolitan Gas Company
J. Ferguson Bell	Derby	F. Bailey	South Metropolitan Gas Company
Samuel Milne	Aberdeen		
W. H. Smedley	Aldershot		
J. Mogford	Briton Ferry		
E. W. L. Nicol	London Coke Committee	J. R. H. Jacobs	Southampt'n
		R. A. Dry	Birmingham
S. Meunier	Stockport	A. W. Smith	Birmingham
James Welch	Stockport	P. G. Winstanley	Wolverhampton
Chas. Wood	Bradford		
Alex. Wilson	Glasgow	W. N. Westlake	Exeter
H. W. Packham	Kingston-on-Thames	T. P. Ridley	Newcastle
		F. P. Tarratt	Darlington
R. E. Gibson	Liverpool	A. W. Branson	West Hartlepool
W. W. Townsend	Colchester		

BRITISH COMMERCIAL GAS ASSOCIATION.

Extracts from the Report of the Executive Committee presented to the General Committee on Tuesday, the 17th Inst.

The Executive have unanimously resolved that Lord Moulton, P.C., G.B.E., F.R.S., be invited to accept nomination as President for the year 1918-19.

Sir Hallewell Rogers, in vacating the presidency, has indicated his desire to act as host to the Association at the first after-war general meeting to be held in Birmingham.

Very satisfactory results have been achieved from the membership campaign—particularly among the smaller gas undertakings. Since the last report 32 undertakings have become members. The Association's work in connection with the canning campaign and the Fuel Rationing Order has, undoubtedly, contributed to this result; and there is good indication that much additional support will be forthcoming in the near future.

At the meeting of the Executive Committee on July 29 the Chairman submitted the following motion, which, after consideration, was unanimously recommended to the General Committee for acceptance:

The Executive are of opinion that the Association stand to gain considerably in many directions by the increased representation of

subscribers on the General Committee suggested in the motion, as follows:

That it be a recommendation to the General Committee that at the next annual general meeting an amendment to Rule 7, as follows, be recommended to the members for adoption:

That in Sub-section E the figure £25 obe substituted for £500; so that the rule would read:

The General Committee shall consist of:

(E) Ordinary members representing:

(1) The several subscribing gas undertakings in various specified areas mentioned below, and

(2) The Society of British Gas Industries or any similar Society.

Such respective representations shall be on the following basis:

The subscribing gas undertakings shall be grouped into the undermentioned areas, each of which areas shall be represented by at least one member, with an additional member for every £250 per annum subscribed by the whole of the undertakings situated within that specified area:

Eastern District.
Ireland.
Manchester District.
Midland District.
Northern District.
Scotland.
Southern District.
South-Western District.
Wales.

(3) The Society of British Gas Industries or any similar Society shall be represented by at least one member, with an additional member for every £250 per annum subscribed by such Society.

The Executive (through the Chairman) have been in constant and close touch with the Coal Controller's Department in connection with the Household Fuel and Lighting Order. Coincident with the distribution of the official forms, the Association's advertising campaign was launched; and in an appendix to the report particulars are given of the papers in which the advertisement appeared, together with samples of the literature published in conjunction therewith. A very gratifying reception has, it is said, been given to this publicity, both by the gas industry and the public.

(Signed) F. W. GOODENOUGH, *Chairman*.

SCOTTISH FUEL AND LIGHT RATIONING.

THE Household Fuel and Lighting Order governing the rations for Scotland has been signed. It comes into effect on Oct. 1—three months later than the English Order.

The allowance for fuel in Scotland is 4 tons where the number of rooms occupied is not more than three; and an additional ton of coal for each additional occupied room up to 20 tons. Thereafter, any additional allowance not exceeding 1 ton per room shall be at the discretion of the Local Fuel Overseer. An extra ton of coal is allowed where the number of habitual residents is seven or more in houses of not more than twelve rooms. Compared with the English rations, this gives an increased allowance on an average of 1 ton of coal, on account of the colder weather in the North.

The Scottish lighting allowance exceeds that of the English by about 20 p.ct., and is as follows:

Where the Number of Rooms Occupied is—	The Lighting Allowance for the Year Shall Not Exceed—	
	Either C.ft. of Gas.	Or B.o.T. Units of Electricity.
1, 2, or 3	9,000	150
4, 5, or 6	13,500	225
7, 8, or 9	18,000	300
10, 11, or 12	22,500	375
13, 14, or 15	27,000	450
16, 17, or 18	31,500	525
19, 20, or 21	36,000	600

Except for these additional fuel, gas, and electricity allowances, the Scottish Order is practically identical with the English Order.

Tar and Acid Constituents of Indian Coal.—Dealing in a lecture at the recent British Scientific Products Exhibition with industrial development in India during the war, Mr. D. T. Chadwick, Indian Trade Commissioner, said that, when considering the large number of derivatives from coal tar, one is met by the unfortunate fact that the yield of tar and acid constituents from Indian coal is as a rule low—only 2·1 p.ct., compared with 4 p.ct. in Great Britain.

Steaming Horizontal Retorts.—Referring to the process of Mr. R. J. Rew, of the Devon Gas Association, for steaming horizontal retorts [particulars of the results obtained by which were given in the "JOURNAL" for May 14 last, p. 280], the "Exeter Express" states that "already about a hundred companies, large and small, have adopted the system; and inquiries with the view to taking similar steps have been made by a very large number of others. It is to-day in use in various parts of Great Britain and Ireland, and practically from Land's End to John o' Groats."

ELECTRICITY SUPPLY MEMORANDA.

THE report of the Board of Trade Electric Power Supply Committee, and its precursor, the report of the Electric Supply Sub-Committee of the Coal Conservation Committee of the Ministry of Reconstruction, have now been in the hands of electrical men long enough for them to have thoroughly absorbed their contents, and to have turned them inside out. Mr. C. H. Wordingham, the President of the Institution of Electrical Engineers, is one of those who keep a well-balanced mind on the subject. He is not a believer, as are some electrical men, in the idea that, when the war is over, the electricity supply industry is going to turn a somersault from present circumstances and find itself at once on its feet, under new and much more favourable conditions. At the same time, he does believe that the reports will have the effect of hastening the evolution of things electrical. In one of the little tabloid lectures at the Scientific Products Exhibition, Mr. Wordingham discoursed on the future of the electricity supply industry. He sees the industry taking a perfectly natural course in its evolution, as it has done all along; but the report of the Board of Trade Committee will help the pace, and reform the conditions. The industry started with small producing stations; and in populous areas these have been displaced by larger stations. The Committee work that has been done during the war will probably result in the abolition right away of all small uneconomical stations, as soon as legislative sanction can be secured. The existing large economical stations will absorb the fresh load; and they in their turn will, as circumstances favour, give place to the super-station. This is a saner view of the matter than is that at the back of the frenzied cries for the immediate construction of super-stations, and a wholesale scrapping of much plant and expended capital.

Generating Station Evolution.

Will the huge super-stations ever come? The wave of opposition against them continues to grow. Critical examination has convinced some engineers that there is not any economy in them, but that there is likely to be much uneconomy, as compared with the large local stations. Experience has shown that fuel economy has its limits; and that above a certain size of sets, there is nothing to be gained. Again, in these large stations the coal-handling plant would have to be on an elaborate and costly scale; and the enormous quantities of coal and refuse that would have to be dealt with would be costly drawbacks. Also the problem of condensing water and plant would be a peculiarly heavy one. In the article by Mr. W. H. Booth dealt with in last week's "Memoranda," he submitted that it would be impossible to utilize the waste heat from these super-stations in any profitable manner, and that this would be a distinct loss. Further, it has been shown that the distribution costs from these enormous plants would, as the distance of distribution increased, annihilate any economies in other directions. Another objection to super-stations is that they would make excellent targets for enemy bombs. Large concentrations of labour is an additional objection; and more so in the times ahead with unionism so much stronger than formerly. Now a correspondent of the "Electrical Review" refers to the "mad-brained" suggestions of the schemers who cannot see further than a big-unit proposition of the steam type, with massive chimneys and plenty of waste gases. For London half-a-dozen stations spread along the Thames could generate as cheaply as one central station The writer also touches upon a question to which we have frequently made allusion; but our view of the matter extends further than his. He holds that the problem of generating electricity should be combined with the larger one of saving coal in the household. We go beyond this, and suggest that the problem of fuel supply should be considered as a whole—from the best system of utilizing coal to the economical delivery of heat units into the dwellings of the people. This would take in coal carbonization, the work that the gas industry is accomplishing, and the greater work it is capable of doing. If electricity can put into houses heat units at a cheaper rate, and give a greater range of convenience, than gas, then the gas industry must go under; if gas can do the work cheaper and give a greater range of convenience than electricity, then the electricity industry must be left to pick up only such business in this line as those people may choose to give to whom economy and convenience do not appeal. The question of heat economy is not to be settled by the *ipse dixit* of electricians or anybody else.

The Whole Fuel Problem—not Part.

Concentration of Manufacture of Appliances.

Reverting to Mr. Wordingham's lecture, he commented upon the principles which should in future direct the manufacturers of apparatus; and in this respect there will be some difference of opinion. In the wake of uniformity of pressure and systems which a common plan of electricity supply would bring about, would be a greater standardization of apparatus. Foreign trade would be better served by concentrated specialization in production than has been the case with the existence of a large number of small firms. The principle to be acted upon after the war would be that each firm should lay itself out for one restricted portion of manufacture.

The advantages of this would be not only that manufacture in quantity would enable cheaper production, but it would tend to "the improvement of design, because when designers had thousands or tens of thousands of the same article passing through their hands in a year (instead of tens of dozens), they were able to acquire a much wider experience of the action of the apparatus they were manufacturing, and to introduce improvements more readily than when they manufactured on a tiny scale." There is something in this view of the President of the Electricals; but it is not the whole tale, nor the whole truth. The proposals as to concentration of the manufacture of a particular class of goods carries with it a limitation of the number, and always the same, brains directed to the end of improvement; whereas with firms competing with one another in the same class of production, a wider range of talent is brought to bear upon the problem of improvement. Competition alone ensures this. Moreover, the very advantage of a cheapening of production may not benefit the buyer with the deepening of monopoly as the large firm barricades itself in by patents. Mr. Wordingham himself appeared to see a danger in his proposals, because he hedged a bit. It would, he said, be a misfortune if this were to tend towards the creation of monopolistic concerns, and to the sweeping away of the small individual concerns which had hitherto existed. But the place to which he would consign the smaller firms is apparently that of order-getters for the larger ones. The best results, he thought, would be obtained if, in addition to the few large firms, "there was a combination among the relatively small firms to get orders which would then be farmed-out to individual firms—each firm taking one distinct class of work in which it could specialize, and to which its principals could devote their personal attention." We rather think the small firms would have something to say to this, and decline to be lackeys to the large firms. Experience in the gas industry shows that when the manufacturing lion and lamb have been induced to lie down together, it is not long before other "lambs" have arisen, and have started on their own account, to the discomfiture of the lion.

The Ebb of the Lighting Units.

Electricity suppliers in shopping areas are being hard hit by the new Fuel and Lighting Order—more so than the gas companies. The reason is that they have not the diversity of trade in electricity that gas happily possesses. Prior to the new Fuel and Lighting Order, the electricians had lost consumption in street lighting, in outside shop lighting, in theatres, music halls, and cinemas, and through the appeals for economy in households. All this means revenue lost at prices per unit higher than the power supply. Now there comes the new Order, and the appeal which succeeds it for economy in the use of fuel in every direction—including gas and electricity stations, especially the latter. Consumers of both commodities are also being asked to economize. In some areas, the electrical undertakings have to subsist almost solely on domestic and shop lighting. Now the Early Closing Association have stepped in with a fervent desire to assist the Coal Controller; and the Coal Controller has duly expressed his appreciation, on the ground that every possible step should be taken in the national interests to reduce the quantity of fuel and lighting. Many shopkeepers have agreed to close at six o'clock (some at seven) every night, save Saturday, when the hour will not be later than eight. It is surprising how in some districts the residents have fallen into line with these changes, which reduce the call for heat and light, and so consumption in electricity, which is hit harder than other heating and lighting agencies owing to the inefficiency of the electricity process in its utilization of coal. Due also to its conditions, it is very sensitive to influences. Reduction of electricity consumption, for example, tends to increase the fuel bill per unit of electricity generated, unless the reduction is all off the "peak," and then there might be some advantage in it, excepting that in these days electricity can ill-afford to see sacrificed the revenue from the higher priced units.

The Hackney Sequel.

We all remember how the Hackney Borough Council went a-begging when the Gas Light and Coke Company put to the test the question of preferential charges for electricity in the particular form which the objectionable item of the Hackney tariff took, which form the Courts held was not governed by previous decisions, which have caused an alteration of charge methods at Long Eaton, Ilford, in certain parts of South London, and possibly elsewhere. The Hackney Council asked other authorities to support the action with funds; but what the authorities who did so have gained is very doubtful, as the result affects Hackney only, and does not, as we say, disturb the more important cases which preceded it. Now we have authoritative information as to the result of Hackney's appeal. They solicited help from 214 authorities. The basis of the solicitation was at the rate of £1 per £1000 (or part thereof) of gross revenue computed from the returns of 1915—the maximum contribution from any undertaking to be £100, and the minimum £5. Only 41 authorities promised very unwisely to support Hackney in their quarrel, and that they unwisely did so is shown by the restricted value of the decision. However, after the hearing of the action, when the cost of the defence was found to amount to only £261 0s. 10d., excluding the services of the Council's officers, those authorities who promised financial assistance, and had not paid, were asked to amend their promised payment by forwarding £5 where the assistance promised had been less than £10, and a definite amount of £6 13s. 4d. in the case of those authorities who did not specify an amount, but agreed to a *pro ratâ* basis—it being found that these contributions, together with a like amount from Hackney, were sufficient to cover the expenditure incurred. Cute Hackney! A "like amount!" It got out of this litigation cheaply; the bulk of the expense being paid by the ratepayers of other areas. To this sort of thing, a stop ought to be put by explicit prohibition.

Lamp Voltages and Dissatisfaction.

A "Dissatisfied Consumer" expresses his discontent in the "Electrical Times" with the attempt of the Tungsten Lamp Association to try to force the reduction of standard voltages from the consumers' end, by making lamps only of certain voltages—thus compelling their use—though the district voltages are something different, unless lamps of intermediate voltages to those specified are purchased at a higher price. This was a matter referred to in the "Memoranda" a fortnight ago [p. 477]. A "Dissatisfied Consumer" regards himself as a helpless victim of a desirable reform. Consumers, however, have no alternative but to purchase lamps that suit the available pressure. They cannot dictate to supply undertakings; but they should not be penalized for the sins of those responsible for inflicting the odd voltages of which complaint is now made. Their position is not that of gas consumers, who, with certain of their appliances, can regulate gas and air supply to suit the service rendered them through their meters by the gas suppliers. The complainer rightly urges that reform should begin at the dynamos or transformers. If electricity suppliers had to pay a higher rate for machinery not of standard voltages, they would hesitate before adopting anything outside them. As lamp traders and retailers will be compelled to stock lamps of standard and non-standard pressures, one fails to see who will benefit apart from lamp firms represented by the Association. One can sympathize with "Dissatisfied Consumer;" but, after all, perhaps the action of the Tungsten Lamp Association will hasten for electricity consumers a desirable reform, which might hang-fire without the pressure thus brought to bear.

RELATIONS BETWEEN EMPLOYERS AND EMPLOYED.

Final Report of the Whitley Committee.

HAVING already presented four reports, the Committee on Relations between Employers and Employed, appointed in 1916 with the Right Hon. J. H. Whitley, M.P., as Chairman, have now issued a final one, as they have come to the conclusion that if they were to undertake further inquiries, there would be a considerable amount of overlapping, either with the work that is now being carried on by the Central Departments or with the duties and functions of the Industrial Councils.

The trend of the four preceding reports may be remembered. The first recommended Joint Industrial Councils, Joint District Councils, and Works Committees for each of the principal well-organized industries; the second proposed an adaptation of Trade Boards to industries weak or altogether wanting in organization, and Joint Councils with Government assistance for cases in which organization is considerable but not yet general; the third dealt with Works Committees; and the fourth contained recommendations on conciliation and arbitration. The present report does not do very much more than summarize the main conclusions of the previous ones.

The Committee add, however, that: "On the question of the adoption of schemes of profit-sharing and co-partnership, we have considered the evidence at present available, and have felt bound to come to the conclusion that it does not justify us in putting forward any general recommendations." In pointing out that the recommendations they have made have the effect of conferring upon the Joint Industrial Councils and industries a large measure of self-government, the Committee add that many of the subjects which might perhaps have been suggested as forming objects of inquiry by them are matters which can more usefully and profitably be considered by the joint organizations composed of those actually concerned in the various trades. Moreover, since the Committee were constituted two fresh Departments of State have been set up—the Ministry of Labour and the Ministry of Reconstruction.

Of the fifteen members of the Committee, five (including Mr. J. R. Clynes) sign a note attached to the report, which expresses their view that, though the amicable relations established between Capital and Labour by the introduction of Industrial Councils or Trade Boards will afford an atmosphere generally favourable to industrial peace and progress, a complete identity of interests cannot be effected, and that "such machinery cannot be expected to furnish a settlement for the more serious conflicts of interest involved in the working of an economic system primarily governed and directed by motives of private profit."

There are 48 applicants for the position of Gas Manager to the Padiham Urban District Council, the salary offered being £300 a year. A Sub-Committee has been appointed to reduce the number.

A NEW LIST OF CERTIFIED OCCUPATIONS.

As from Thursday, there comes into force a revised list [R.136] of certified occupations, which supersedes all previous lists. It is confined to questions of exemption coming before Tribunals. The authorities have decided that the work of men in the occupations named in the list is of national importance; and such man [subject to the obtaining of an individual certificate of exemption as provided in the regulations] is exempted from being called up for service provided he was engaged in the occupation on Jan. 1 last, and has since continued to be so employed, and, if in Grade I. or II., was born in or before the year indicated in the list. The same applies to Grade III. men, where a separate year is indicated; but where no age limit is stated, all men in Grade III. are entitled to be treated as in a certified occupation. In this connection, it has to be noted that a man whose rights of application to a Tribunal are restricted in consequence of any Withdrawal Order or Proclamation, does not have fresh rights conferred upon him by anything in this list. It is not necessary, in the case of an employed person, that he should show that he has been with the same employer since Jan. 1 last. It must always be remembered that the inclusion of a man in the list does not in itself exempt him from military service. His case will be heard by a Tribunal in the ordinary way; but the Tribunal will be guided by the fact that applicant is included in the list, and the National Service Representative will only in very exceptional circumstances oppose his exemption.

The former distinction between single and married men has been discontinued; a shorter period of qualification has been fixed; and there are numerous alterations in the occupations which are certified, and the ages to be attained, to qualify for inclusion. In many occupations, the raising of the ages automatically cancels certificates already granted.

With a few exceptions, the list covers all men of the new military age of all medical grades engaged in the occupations mentioned, including directing heads of businesses, managers, and departmental managers. To be in a certified occupation, the directing head of a business, the manager, or the departmental manager [Grades I. and II.] should, according to the figures in the list, have been born in or before 1875, though discretion is left with the Tribunal in other cases. For a works chemist [Grades I. and II.], the year given is 1889. The list contains particulars with regard to carters, lorrymen, and draymen; foremen, fitters, and others in engineering works and foundries engaged in manufacturing or repairing machinery or plant for use in trade or industry; blacksmiths; foremen [Grade I., 1883; Grade II., 1888] and all other classes of workmen [Grade I., 1875; Grade II., 1880] engaged in the manufacture of incandescent gas-mantles; all classes of workmen engaged in the manufacture of furnace fire-brick and fire-clay goods; and all classes of men connected with fertilizer manufacture—including sulphate of ammonia. Analytical, consulting, or research chemists are to be treated as in a certified occupation if recommended by the Royal Society [Grades I. and II., 1894].

The list is on sale by the Government, price one penny.

SIXTY YEARS AGO.

[From the "Journal" for September, 1858.]

Candles as Standards.—The photometric testing of gas has now become so thoroughly engrafted on our code of regulations for the administration of gas companies, that information on the subject is eagerly sought after, in spite of the discredit brought on it by the unskilfulness of some of the early experimenters. The most elaborate paper on this matter which has yet fallen under our notice is a hitherto unpublished report made in 1852 by Profs. Brande and Graham, Dr. Leeson, and the late Mr. J. T. Cooper, to the Directors of the Great Central Gas Consumers' Company, which was brought before the Arbitrators in the course of the late litigation with Mr. Croll. The deservedly high estimation in which the names attached to this report are held, entitles whatever they may suggest to our respectful consideration; but we are compelled to say that, in our opinion, a great sacrifice of valuable time was made in searching for what has hitherto proved a chimera—namely, a positively uniform standard candle, when the same results might have been obtained by noting the actual consumption of any candle, and the comparative light emitted during an experiment, and thence deducing, by a simple rule-of-three equation, the value of the gas-burner in candles of any arbitrary consumption per hour. The experiments detailed in the report prove that the best candles are too uncertain in their rate of consumption to permit of their being used as standards in any photometrical experiment where accuracy is desired, without their actual consumption be also determined and taken into account.

Clegg's Governor.—Mr. Clegg requests us to state that he has succeeded in combining a governor or pressure-regulator with his new patent hydraulic gas-meter, which is now in operation; and we perceive in the Paris papers a notice to the effect that, after submitting the self-adjusting and compensating gas-meter of Messrs. Crosley and Goldsmith to the most severe tests, and having ascertained that it registers the exact quantity of gas consumed, without absorbing more than the ordinary pressure required to set such instruments in motion, the Prefect of Police of the Seine has authorized its being used within his jurisdiction.

DUST IN GAS COALS.

By a GAS ENGINEER.

SOMETHING has been said about the enormous advances in the cost of gas coals, accompanied by reduced quality, as shown by increased incombustible content. But this does not cover the whole of the troubles inflicted upon retort-house managers by war conditions. Instances of trouble due to excessive percentages of dust in various parts of the country have come to the writer's knowledge in addition to his own experience; and as proof that complaint is founded upon fact and not on fancy, he may quote examples of recent deliveries fairly taken from bulk in gas-works coal stores, each one from a different district, showing that the trouble is not limited to any one locality.

"Dust" in coal is a loose term; but the sense in which it is here used is the proportion of the bulk that will freely pass through a brass wire sieve having ten meshes to the linear inch, or a hundred to the square inch, in the course of a few minutes' gentle agitation. The samples, which must, if necessary, be previously air-dried, will be freed from dust, in this way, in from three to five minutes at the outside.

	Weight of Sample.	Weight of Dust.	Percentage of Dust.
I.	3314·8 grains	1344·2 grains	40·6
II.	2941·1 ,,	627·9 ,,	21·3
III.	6880·6 ,,	1472·0 ,,	21·4
IV.	2468·1 ,,	301·8 ,,	12·2
V.	4820·5 ,,	1830·6 ,,	38·0

These are all unscreened coals, and the wide variation shows that the larger proportions are not unavoidable incidents brought about by war conditions, but really amount to bare-faced adulteration under Government control and cognizance. If one colliery can supply only 12·2 p.ct., it is not reasonable to assume that with another the minimum is 40·6 p.ct.

That coal dust of the character above indicated is a very slow and poor conductor of heat is common knowledge to all experienced carbonizers; and one reason why many gas engineers prefer screened coal (when they can get it) is founded on this fact. Directly the proportion exceeds 10 p.ct., there is trouble in the retort-house, and revision of the weight or duration of the charges must be considered, because the dust lies dead in the retort, and does not commence to evolve gas for a considerable time after the lid is closed—as much as two hours in extreme cases. The production per retort falls; and there is a corresponding increase per ton of coal carbonized in labour, wear and tear, and consumption of furnace fuel. All these are important considerations, apart from the present scarcity of labour and difficulty in carrying out renewals; and the possibilities of employing women in the retort-house are not enhanced by the introduction of a staple material that will smother them with black dust. It will tend to drive them away from the gas-works, as it does the men, in the direction of lighter and more comfortable environments of labour, of which a wide selection is now available.

As a matter of common honesty as between buyer and seller, 40 p.ct. of dust, even at a commensurate price, in place of the Government maximum, does not constitute gas coal. The supply of such an article in pre-war days would have resulted in absolute boycotting. Much has lately been said about the "monopoly" enjoyed by gas undertakings, and mostly from an unfair and one-sided point of view. The facts that the word should be prefaced by "regulated," that the rules as to price, quality, and purity are stringent, and that excepting a few failures, due to uncontrollable circumstances, they have been most rigidly observed, have been totally overlooked. The gas consumer is at liberty, if he wishes, to substitute other agents for gas; but under districting arrangements, and the practical impossibility of placing new business, gas-works are at the mercy of one colliery, and the monopoly is absolutely free from any restrictions as to quality. We have been told that complaints will be considered; but, as a matter of fact, many gas companies do not care to face the risk of complaining, in view of the difficulty of maintaining adequate supplies. Therefore they continue to pay, and the colliery people to receive, 30s. or so per ton for a material that five years ago they would have been open to sell for 3s.

The losses to gas undertakings, or troubles to gas engineers, do not meet with much consideration or sympathy in certain quarters; but the national aspect of the matter should commend itself to a wider circle. Coal tonnage, transport, and saving of labour appear to be all-important at present, and to take precedence over the production of munitions materials. These matters are all influenced by substituting for gas coal a material that makes 25 p.ct. less gas per ton, and 30 p.ct. less per retort per twenty-four hours. A proportionate addition to the cost of transit and handling does not cover everything; but there are many incidental losses in addition. France and America have realized the importance of quality in coal, judged from this standpoint; but here it seems to be regarded with indifference, even at the present serious juncture. In these countries, however, departmental committees are selected from the principal representatives on both sides of the counter.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

HALF-YEARLY MEETING AT NEWCASTLE-ON-TYNE.

The Half-Yearly Meeting of the Association was held last Saturday afternoon at the offices of the Newcastle and Gateshead Gas Company, Grainger Street West, Newcastle. Mr. NORMAN S. COX, of Sunderland, the President, was in the chair; and there was a large attendance.

NEW MEMBER AND ASSOCIATES.

Mr. Clarence Harris, of Jarrow, was elected a member of the Association, and Mr. Frank Cooke, of Sunderland, and Mr. Robert Frederick Harbottle, of South Shields, associate members.

The PRESIDENT then delivered his

INAUGURAL ADDRESS.

Gentlemen,—For the honour you have done me by electing me your President, I most cordially thank you. Thirty-eight years ago, the Association visited Sunderland, when my father had the privilege of presiding over its deliberations. The continued success of the Association is a subject for hearty congratulation. Few professional men are so isolated as gas managers; and the opportunities presented by these and other meetings to compare notes and interchange ideas, can only have one result—benefit to all concerned.

SUNDERLAND AND PAST AND PRESENT GAS SUPPLY CONDITIONS.

As it is some years since I left the manufacturing department, I purpose in my address to deal mainly with the commercial and distribution sections of a gas undertaking's management.

Sunderland is favourably situated for the manufacture of gas from its accessibility to the source of raw material; and it has availed itself to the utmost extent of the advantage it thus enjoys. Notwithstanding these facilities, it was not till May 9, 1824, that the town was lighted with ("that most desirable light," as it was justly termed) gas. The promoters of the first company, in their efforts to inaugurate a brighter era in lieu of the comparative darkness that previously prevailed, made little progress; the inhabitants, with caution and reserve reminding one of their neighbours north of the Tweed, refrained from participating in the advantages to be derived by the use of the new light. The "Sunderland Subscription Gas Light Company," which was formed in 1831, bought-out the old concern, and received considerable support, although the prices charged according to the type of burner used were excessive, and they continued to remain so till January, 1845, when the only certain antidote to monopoly—viz., competition—appeared in the form of the "Corporation Gas Company." The element of competition thus introduced into the gas supply of Sunderland soon told a tale. Before the threatened opposition fully entered the field, the existing Company reduced their price from 10s, to 5s. per 1000 c.ft. The Corporation Gas Bill received the Royal Assent on June 18, 1846; the price of gas being fixed at 4s. per 1000 c.ft. But, as the inevitable consequence of the dual control, the old Company almost simultaneously lowered their charges to the same scale. Troublous times were experienced by the new Company; and only with considerable care and economy were they able to carry-on. Matters, however, improved; and new consumers were forthcoming. So, in the endeavour to check the progress of the new Company, the old one announced a reduction to 3s. 6d. The new Company, receiving an early copy of the notice, decided to reduce to 3s.; and the Secretary was given instructions to continue if necessary till a minimum of 1s. per 1000 c.ft. was reached. The old Company came down to the 3s. scale; but beyond this point the war was not waged. On one occasion, owing to a breakdown at the old Company's works necessitating the shutting off of the supply, it was observed that some of the premises it supplied were still able to obtain gas; and it was found that "inadvertently" the services had been connected with the new Company's mains. Trouble and strife continued till July 1, 1854, when the "Corporation Company" became the sole possessor of the field—an agreement being arrived at with the retiring rival, after which all went smoothly. Gas directors are but human; and, finding it impossible to continue to supply at the low price of 3s., and although unwelcome to the consumers, it is not surprising that the "Corporation Company," finding itself monarch of all it surveyed, advanced the price from 3s. to 3s. 9d. The same year witnessed an extension of its operations in the introduction of gas into Southwick. By the inhabitants of this suburban village, the event was hailed with high satisfaction and delight.

The average quality supplied was 16 candles, which in the days of flat-flame burners was a distinct advantage; the sulphur compound being well below the recognized limit.

By the 1857 Act, when the title was altered to the Sunderland Gas Company, the Corporation was empowered to appoint an analyst to test the quality; but the law was complied with with such uniform efficiency that the tests were discontinued, and the lack of complaints shows that the public has not suffered by the withdrawal of the watchful eye of officialism.

Progress has been the watchword of the Company; and the policy of selling a satisfactory article at the lowest possible price was persevered with. The price continued downwards, with the exception of the year 1873 (locally and historically known as "Coal Famine Year"), till in 1911 gas was supplied at 1s. 9d. to 1s. 4d. net, and 1s. 6d. to 1s. net for power purposes. The price under war conditions has naturally increased. The gas made in 1848 was 40 million c.ft. per annum; in 1884, 480 millions; and in 1917, 1288 millions.

COAL AND RESIDUALS.

In this district, up to a few months ago, we had no reason to complain about the supplies of coal, which we received in a fairly satisfactory manner. The quality, however, is not all that could be desired. Latterly, things have been difficult. Much anxiety has been caused by short deliveries; and the resultant diminishing stocks is a further indication of the absolute necessity of all gas undertakings keeping large reserves. Coal is the essential factor, and the basis of all industries, and has provided everything—including the necessities of civilization, light, heat, and power. It has, however, been used in the most reckless and extravagant manner by being consumed in the raw state, destroying the valuable fuel oil, dyes, motor spirit, fertilizers, &c., and at the same time giving off clouds of smoke from the numerous factory and household chimneys, making conditions of living in populous centres undesirable and in many ways unhealthy, in addition to being injurious to property.

Much has been done, and much more may be done, to stimulate the demand for coke for household and manufacturing purposes; and the more general adoption of coke would help in that most essential and desirable endeavour to conserve the coal of the country.

There will be an enormous demand for benzol after the war, in connection with transport both by land and sea and in the air; and it may, no doubt, be found a paying proposition to continue its manufacture, if the naphthalene troubles arising out of its recovery can be overcome.

The co-operative arrangement between tar producers and distillers (which has almost reached the stage of agreement) should have a beneficial effect. Large quantities of dehydrated tar will be required for the reconstruction of roads after the war; and this, together with the laudable endeavour to make this country self-supporting respecting dyes, should stimulate the demand, with a subsequent improvement in the price, which has been at such a low ebb for so many years.

Notwithstanding the large amount of propaganda work carried out by the Sulphate of Ammonia Association, and by many undertakings in their own districts, the home consumption of sulphate was only a small percentage of the output. But the conditions of war have changed this; and now the farmers, who are not easily convinced as a rule, are generally quite satisfied as to the enormous advantages to be obtained by treating their land scientifically.

The results so far obtained by the utilization for public purposes of surplus coke furnace gas have been eminently satisfactory; and where available in large quantities, it should enable gaseous fuel to be sold at a price to brook no competition.

The sole object of the Household Fuel and Lighting Order, 1918, which entails an enormous amount of work and serious financial loss to the gas industry, is the saving of coal, the necessity for which is no doubt great. The industry, however, will use every endeavour to faithfully carry out its share of the burden. The Order is presumably intended to encourage the use of gas, which is undoubtedly the best method of obtaining the desired result, and at the same time assist in relieving the transport difficulties. The gas equivalent per ton of coal has been fixed too low to attain this end. It should be substantially increased—especially in this bleak district, where the hours of daylight are less than in other parts of the country and where baking and washing are usually done at home.

THE SALES DEPARTMENT.

With regard to the distribution department, the interest of the consumer and supplier is a mutual one. The relationship between the showroom, development, and fitting departments should be the closest co-operation. In the apparatus supplied, simplicity and standardization, coupled with efficiency, are of the utmost importance. Central offices and showrooms adjoining, if possible, should of necessity be imposing, and in a prominent position in the principal street, and should be kept up-to-date in every way, and not be allowed (as is unfortunately noticeable in many showrooms) to get an uncared-for appearance after the novelty has worn off. Consumers should have the opportunity of seeing the various apparatus tested, and claims should not in any case be made which cannot be substantiated in actual practice. This is, unfortunately, done occasionally by makers; and when the consumption is proved to be in excess of the claim, the consumer is dissatisfied. It is much better to slightly overstate the consumption, as the margin in favour of coal gas is sufficiently large to

allow of this in most instances; and when the results prove better than the guarantee, all concerned are satisfied.

The subject of gas sales is not of great importance under existing regulations; but there is still a large field for extension in this direction. Preparations, wherever possible, should be made in advance, to enable full advantage to be taken immediately the restrictions are removed.

Proper ventilation of all buildings is of vital importance, whether in the factory or home, as efficiency can only be obtained if it be under hygienic conditions. Gas has played an important part in this direction; and should do much more in the future. Where new buildings are to be erected, it should be part of the undertaking's policy to co-operate with the architects to obtain adequate ventilation, and also to keep them posted in regard to the many advantages of gas.

In 1913, we established a demonstration room, where the latest types of furnaces are to be seen by appointment in actual operation at suitable times, when influential men likely to be interested are invited to be present. As a result of this, combined with energetic canvassing, upwards of a hundred have been fitted during the last few years for numerous and varied purposes, and special apparatus is being designed for the preliminary heating of an electric steel melting furnace to reduce the fuel cost per ton of steel. The following figures show that considerable strides have been made:

GAS USED FOR POWER PURPOSES.

1913	. .	195 million	c.ft. per annum—principally engines.
1914	. .	215	,, ,,
1915	. .	230	,, ,,
1916	. .	235	,, ,,
1917	. .	270	,, ,,

Showing an increase in the gas used under this head of 38 p.ct., due entirely to the introduction of furnaces.

One local firm who originally conducted all their heating operations by coal and coke, now use gas exclusively for annealing and hardening. About 120 tons of steel are turned into files per annum; and the gas consumption for this and other purposes is 1,181,000 c.ft. A more striking illustration is of a local glass-works, whose gas consumption before furnaces were adopted for annealing and fire-polishing was 3 million cubic feet per annum, whereas now it amounts to nearly 50 millions. Better working conditions prevail; far superior results are obtained; and the breakage in annealing is reduced from 10 to 2 p.ct.

The prosperity of a gas undertaking depends very largely on the methods adopted to retain their consumers, to obtain new ones, and to encourage the use of additional and up-to-date apparatus. Collectors and inspectors are in contant touch with the public, and can assist very materially by entering daily in a report-book all cases where there is any sign of dissatisfaction, or where there is a likelihood of obtaining an order for new appliances. This book forms the basis for the work of a staff of carefully selected canvassers, who must be well trained and thoroughly conversant with all matters concerning the economical use of gas. The old saying that dividends are made or lost in the retort-house is only half the truth, as, while they may be made there, they can easily be lost in the other departments. It may be said that the consumer is gained or lost at the burner.

WAR AND POST-WAR CONDITIONS.

The many necessary extensive alterations and repairs held in abeyance to be carried out after the war will mean an enormous expenditure; and undertakings that have been able to do so have wisely put aside sums to meet repairs, which will have to be attended to as soon as possible. The raising of capital will be a difficult problem; and stock will in most instances have to be sold below par.

The inflated wages now being paid will not return to their pre-war level, with the result that all materials will cost more, unless the output per head be considerably increased—there being still plenty of room for improvement in this direction, as this country is a very long way behind. The general adoption of machinery wherever possible will have to be resorted to, or our chances of holding the premier place as an industrial and commercial nation will indeed be small. I am a great optimist regarding the future supremacy of the country; but it will need forceful energy and concentration in all directions, and friendly and loyal co-operation between employers and employed, to enable us to retain our position against strenuous and powerful opposition.

When the necessity for purchasing War Savings Certificates ceases, it is very desirable to be ready with an approved scheme of investment in some safe security, to encourage the employees to continue without a break their weekly contributions.

Enormous scope of business is available to the industry if only it realizes, and is prepared to grasp, to the fullest extent its possibilities. The lines of future development are clearly indicated, and the prospects most alluring, with the expansion of the industrial business and the great possibilities in hot-water supply and room-heating with a gas not necessarily of high calorific power, but one containing a low percentage of incombustibles—thus giving a good flame temperature.

THE CONSUMERS' TROUBLES.

We have always been troubled with that bugbear to many gas undertakings, naphthalene. But immediately on starting oil-washing for the extraction of benzol, toluol, &c., the number of complaints of stopped services jumped up to an alarming extent; so much so that after a fortnight's working the plant had to be shut-down. It was re-started a few days later under altered conditions; and the results showed some improvement. However, we have suffered considerably ever since, and the additional cost over previous years has been a serious item.

A still more serious point is the annoyance and inconvenience caused to consumers by the continued necessity for clearing their services, which makes them dissatisfied with gas, and possibly consider the advisability of making a change. In some known cases they have actually done so, which means a permanent loss to the Company through no fault of their own. At one period of extreme changes in atmospheric conditions we in one day received upwards of two thousand complaints; and with the shortage of labour it was quite impossible to cope with this number. However, with the assistance in emergencies of the available officials (all of whom had been previously instructed in the art of clearing stoppages), in addition to all the fitters and labourers, we have so far been able to overcome the difficulties.

With the object of obtaining useful information, a map of our area of supply is divided off into squares and districts, and each week tracing paper divided into similar squares is placed over the map, and every day the naphthalene stoppages cleared are marked thereon by black dots for the ordinary consumers and by red dots for the slot consumers. One expected but nevertheless marked feature is the absence of dots in the area supplied from the vertical retorts. Another is that the red dots represent a very small proportion of the total; the reason being that, when we adopted prepayment meters, we deemed it advisable to lay services in excess of the anticipated consumption. This map is inspected daily; and one can see at a glance if there is a prevalence of complaints in any one section or street, in which case we wash-out the main or mains affected, and, if this is not efficacious, open and clear them. I had hoped to see the dots near the works gradually reduce in number, and then week by week the area clearing further away, showing that the solvent used at the works was gradually not only overcoming the naphthalene in the gas, but also that in the mains, and that ultimately we might be freed to a considerable extent, if not altogether, from this source of trouble. Unfortunately, however, there is no sign so far of this ideal being realized.

Every endeavour should be exerted (which has certainly not always been the case in the past) to avoid reckless and extravagant expenditure of capital. On the other hand, no one would suggest working obsolete and wasteful plant. There is, however, a happy medium. If an undertaking becomes over-capitalized, their difficulties in meeting the serious and stern competition in the future are much enhanced. The sliding scale has, no doubt, many advantages when wisely administered; if not, it is fraught with dangers—a tendency being to possibly starve the works to enable a reduction to be made in the price of gas and automatically increase the dividend. A figure that should never be lost sight of is the capital per million cubic feet of gas sold.

GAS FOR TRACTION PURPOSES.

The use of gas as a power agent for traction purposes is steadily increasing. We all, I think, agree that the bulky containers are unsightly; but at present utility is the most important factor. However, when war conditions permit of the manufacture and supply of compressing plant and cylinders, the use of gas propelled vehicles may be greatly extended.

A 20 H.P. "Studebaker" van used in connection with the clearing of slot-meters—one of the earliest cars fitted with a flexible container, and holding some 250 c.ft. of gas—covers a distance of 11 miles (equivalent to approximately a gallon of petrol) and has given every satisfaction. Two coke delivery wagons have also been adapted, It is very necessary to have suitable appliances for keeping the bag in position when deflating; otherwise it flies out and may catch obstructions, which might be fraught with serious results.

We have a small experimental plant comprising a two-stage vertical compressor with piston displacement of 15 c.ft. per minute, which will compress gas to 1200 lbs. per square inch when running at 400 revolutions per minute and a 7 in. diameter water separator. A 10 B.H.P. two-seater "Humber" has been running on coal gas compressed to 1200 lbs. per square inch. The steel cylinder 3 ft. 4 in. long by 8 in. outside diameter, with a capacity of 84 c.ft., carried at the back, weighs 98 lbs. The gas passes through $\frac{3}{16}$ in. inside and $\frac{5}{16}$ in. outside diameter copper tube to a reducing valve, pressure gauge, and suction chamber, weighing 14 lbs. (where the gas is filtered, and the pressure reduced to a few tenths of an inch), and from there to a special carburettor. The car starts easily, runs smoothly, and will cover 8 miles on one charge. At present, however, a reduction in the power (particularly on the hills) is noticeable. As it is only used for supervision work in our own area of supply, and can be switched-on to petrol if necessary at any time, the difficulties of filling stations do not apply. However, for the future it will be necessary to build specially adapted vehicles, and to standardize cylinders and connections to enable users to have them quickly charged at the appointed stations at any town or village on the main routes, or (better still) in the case of detachable cylinders, to change their empties for full ones.

THE ORGANIZATION OF THE GAS INDUSTRY.

The various organizations intended to represent the industry have, no doubt, done excellent work during the war; but it seems

more than ever essential to have a national body, representative of every section of the industry, which can speak unitedly and authoritatively on its behalf on all subjects. There are signs that the necessity is at last being realized; and I trust that steps will immediately be taken to make this an accomplished fact, and that it will meet with the whole-hearted support of every undertaking in the country.

Reviewing the past few years, which have been momentous, one cannot help coming to the conclusion that at the happy termination of this terrible war, a new and more prosperous era is dawning. We have heard much about the centralization and amalgamation of electric undertakings. If the gas industry is to prosper, similar amalgamation may be necessary, perhaps not to such an extent, but for the large and suitably situated gas undertakings to extend their plant and also their area of supply to embrace smaller undertakings.

Mr. THOMAS HARDIE (Newcastle), in moving a hearty vote of thanks to the President for his address, said Mr. Cox had reminded them that the Association met in Sunderland some 38 years ago, under the presidency of his father; and he did not know that there were any there that day, with the exception of Mr. Whyte, who were present at the meeting in Sunderland. A large number of the members, however, remembered Mr. Cox, senior, and the result of his work in connection with the gas undertaking at Sunderland. It was still visible to-day in the low price at which gas was sold in this neighbouring town. The Association were not only indebted to Mr. Cox's father, for they also remembered that, many years ago, his brother read a most excellent contribution on the manufacture of sulphate of ammonia, which still to-day might be regarded as a work of reference on the manufacture of the product. That day they had Mr. Norman Cox's excellent address, which showed that he had the far-sightedness of his father, which had resulted in such satisfactory financial results for the Sunderland Company. He (Mr. Hardie) desired to refer only to one suggestion made by Mr. Cox—that when the necessity for purchasing war-saving certificates ceased, it was desirable to be ready with an approved scheme of investment to encourage employees to continue without a break their weekly contributions. The speaker considered it an excellent suggestion, which he hoped would commend itself to gas undertakings generally.

Mr. F. P. TARRATT (Darlington) seconded the motion, and said the breezy address they had listened to was quite typical of its author. As an Association, they were indebted to the assistance that had always been given from Sunderland. There were many points in the address which might be referred to; for it showed that the President was keenly in touch with all that was at present before the gas industry.

The motion was heartily carried.

The PRESIDENT, in reply, said he was obliged for the kind things that had been said of the address. He confessed that in the stress of the present time, and the worries that were experienced, it was difficult to find time to produce an address of any kind. He was therefore glad that he had written an address which, to some extent at least, had been appreciated.

HOUSEHOLD FUEL AND LIGHTING ORDER.

Subsequently there was a discussion—which was opened by Mr. H. E. Bloor, of York—on the Household Fuel and Lighting Order, 1918; but this it was resolved should be conducted in private.

Concrete Purifiers at Rochester (N.Y.).

There have been designed and constructed by the engineering staff of the Rochester (N.Y.) Railway and Light Company eight concrete purifier boxes—four in 1910 and the other four in 1916—which have been in continuous use since they were installed, and are now in satisfactory condition. The roof is sectional, and built of steel; the body of the box being of 1 : 2 : 4 concrete. The bottom is 21 in. thick, the sides 30 in., and the ends 15 in. Each box is 25 ft. square, and 8 ft. deep; extending 4 ft. above ground. The side-walls are reinforced with steel rods. In connection with this installation, it has been pointed out that it is essential, in building a concrete gas purifier-box, that a rich concrete mixture should be used, carefully mixed and placed, and that adequate reinforcement should be provided in the walls to prevent cracks through settlement or other causes. Furthermore, the placing of the concrete should be a continuous operation, in order to eliminate construction joints, as small cracks and seams would permit the escape of gas.

Wood and Peat for Gas Making in Denmark.—The carbonization of wood and peat for gas making in Denmark was, says the "Journal für Gasbeleuchtung," necessitated by the shortage of coal in 1917. Horizontal hand-fired retorts were used; and a certain amount of coal was carbonized, but separately from the substitutes. Trouble occurred owing to accumulations of pitch in the hydraulic main; and on distribution of the gas there was an increase of trouble due to naphthalene stoppages. The yield of ammonia was small; but the admixture of a proportion of coal gas sufficed to neutralize the acetic acid present. The air supply of gas appliances required adjustment; but apart from an increased consumption, the gas behaved satisfactorily in most of its applications. The pitch from wood and peat was valueless; but the brown tar found a ready market. The wood charcoal proved to be well adapted for use in suction-gas producers. Peat charcoal, however, was less satisfactory, as much of it was small, and had to be employed as an indifferent domestic and industrial fuel.

MANCHESTER COLLEGE OF TECHNOLOGY.

A HIGHLY creditable record of investigations undertaken by members of the Manchester Municipal College of Technology during 1915 is contained in Vol. IX. of "Technology"—the Journal of the College. Previously, this record has been issued under the title of the "Journal of the School of Technology;" but with the alteration of name there have been other changes made which it is anticipated will be appreciated by readers. The College, which was founded nearly a hundred years ago as the Manchester Mechanics' Institution, has attained university rank, and attracts students from all parts of the world. One of its functions is to provide university training which is now coming to be regarded as almost essential to all members of the higher staff of important industrial concerns; and so far as this branch of work is concerned, the College is actually an integral part of the University of Manchester.

Mr. J. C. Maxwell Garnett, M.A., is Principal of the College, and Dean of the Faculty of Technology in the University of Manchester. The record now before us opens with a paper on "Education and Industry," which he read before the British Association, and a note by him entitled "Part-Time Education," which is an abstract of a communication to the Fourth Annual Conference of Educational Associations. Passing over investigations bearing upon the electrical industry, mention may be made of one or two of the many articles that are reprinted from various publications. Mr. S. Lees, Wh.Sc., M.A., deals with the effect of variation of specific heat with temperature on the theoretical efficiency of the Diesel engine; while Prof. E. Knecht, Ph.D., M.Sc.Tech., gives methods of estimating nitrates, valuing hydrosulphites, and (with Miss Eva Hibbert) of estimating sulphurous acid in sulphites and bisulphites. Mr. S. Evans furnishes some examples of metal failures in plant which, he says, "are very simple in their treatment, but perhaps serve to show how the chemist may be of service in an engineering works, where at present, it is to be regretted, he is often looked upon as somewhat of a luxury." Another reprint of a paper read before the British Association is that by Prof. W. W. Haldane Gee, B.Sc., M.Sc.Tech., on "Manchester and the Smoke Problem." The book was produced in the Department of Printing and Photographic Technology of the College, to the excellence of the work in which it bears full testimony.

The prospectus of University Courses in the College for the session 1918-19 is ready; and it may be added that the Michaelmas term will commence on the 3rd prox.

PROHIBITIVE PRICES OF STOKING MACHINERY SPARE PARTS.

By E. DAVIES, of Birmingham.

AMONG the many complex problems that face gas engineers at the present time is the one of stocking spare parts for stoking machinery, as prices were never at more prohibitive figures or deliveries more uncertain.

It is a question of whether engineers shall place their orders now, or await the market getting easier when peace is declared. Whether prices will descend then is a doubtful conjecture. True, the engineering industry will cease munition work; but there is the enormous amount of contract work held up during hostilities, in addition to the activity we can expect in the shipbuilding and bridge-manufacturing branches, together with the shortage of coal and raw material, that will maintain the present high rates continuing for some time to come. The only part of the engineering likely to experience a slump is the machine tool trade, when the thousands of lathes, &c., manufactured specially for shell work are rendered idle, and disposed of cheaply.

The costs of spare parts form an important item in the upkeep of plant, and require details being thoroughly looked into, as the two following instances, which occurred in pre-war days, will show. Shortly after the installation of electrically-driven stoking machinery in a retort-house, six spare brass trolley-wheels were ordered from the makers of the machine. On the account being sent in, it was found that a charge of 7s. 6d. for each wheel had been made. One of these trolley-wheels was submitted to a local firm of brass founders and finishers, who were asked to quote for supplying a machined wheel similar in every respect. Their estimate was 2s. 6d. each. Thus three wheels were obtained for the price of one, and actually gave a working duration of a fortnight more than the higher-priced articles.

The other case was where a wrought steel reversing lever, fitted with a pawl and spring, and brass bushed in the boss, was required for a charging machine, so that the existing lever could be taken out and re-bushed at leisure. A fair price to have paid for this would have been 30s. Yet on the bill arriving the charge was £5 5s. Shortly after the principal of the firm called at the gas-works, and his attention was drawn to the exorbitant charge made for the lever. He reduced the amount £1, but remarked that one must expect to pay extra for specialities.

Quite recently, the writer had brought to his notice two cases which do not enhance the reputation of the British for fair trading. One was where a quotation was asked for the supply of

hardened steel shafts for running in roller bearings, and the other referred to a boiler mounting. In both instances quotations were sent in. On the orders being placed, however, apologizing letters were received from each firm, stating that, owing to the typist's error, the prices submitted had been too low; and in the case of the boiler mounting, a further £3 10s. was asked for. Yet surely if a genuine mistake had been made, the onus was on the signatories of the letters and not on the typist.

There are many instances where asking for a quotation is not economical—such as calling in a local firm to overhaul an engine or pump.s, &c., because, to cover themselves, they pile it on to the estimate. Having such work executed on the time and material basis would prove much cheaper.

Although the gas industry has done so much for the Government during the war, the latter have not reciprocated in the matter of priority certificates. The minimum time promised for delivery nowadays of almost any machinery spare parts—from a Hans Renold chain to a cast-steel wheel—is six months. Yet one is compelled to go to these makers of specialities for fresh supplies; so that, even with the abnormally excessive prices now ruling, the stock should be maintained to prevent carbonization being held up. Therefore, it behoves those responsible to place their orders as early as possible.

Case-Hardening Gas-Furnaces.

The Rochester (U.S.A.) Gas and Electric Company have investigated the possibilities of converting both coal and oil fired case-hardening furnaces to gas, under conditions in which the prospective consumers were willing to pay an increased cost for fuel, in order to do away with the obnoxious fumes and uncleanliness that existed. In the first case [as related by Mr. S. S. Amdursky, in the New York "Gas Industry"], the coal-fired furnace was redesigned to a gas-fired recuperative type; and the cost of fuel was even less per unit than with the coal-fired furnace. There was quicker and more uniform heating, as well as a smaller percentage of spoiled material. Later, two additional gas-fired furnaces were installed. Up to this period, the process had been to pile-up at one time in the furnace ten cases containing packed shafts; and after nine hours of continual heating, these were removed for cooling, re-heating, and quenching. At this rate, an average of twenty shafts were hardened per day. The new furnaces, however, are built on an incline, and contain standard rails upon which the cases are rolled towards the front end by gravity. There is mechanism so designed that, when a lever is pushed forward, one case is allowed to roll out; the others being held back. The front door operates simultaneously with the lever-handle. When the handle is returned to normal position, the remaining cases roll down, in consecutive order, a distance equal to about one-third the circumference of a case; while the front door is tightly closed. Each case is thus subjected to the same treatment as the next. Spacers are provided to keep them apart, in order that the heat may be more evenly distributed around the cases. About one-third of the furnace length is used as a pre-heating chamber, absorbing the heat from the waste gases, and pre-heating the cases up to a cherry red before entering the hot zone. Taking readings of the furnace temperature over a period of eighteen hours, a variation of only 8° was noted. It is estimated that from 35 to 40 shafts will be produced per 24 hours at a saving in fuel consumption per unit of 10 to 20 p.ct. over that used in the converted furnace—thus showing that a greater output at higher efficiency is to be had in a furnace specially designed for gas than in one converted to this fuel.

Manchester and District Junior Gas Association.—There will be a meeting at Altrincham on Saturday, the 5th prox., when the gas-works will be visited, for the purpose of inspecting extensions recently carried out. In the evening, Mr. J. B. Stewart, of Rochdale, will read a paper on "Distribution Problems;" and afterwards there will be a discussion on the Presidential Address of Mr. C. E. Teasdale, of Salford [see "JOURNAL" for April 9, p. 56]. Tea will be provided by the Altrincham Gas Company.

Tar-Oils for Impregnating Wood.—It is stated by the "Zentralblatt der Bauverwaltung" that the German Ministry of Public Works have carried out experiments upon the results of impregnating wood with tar-oils. There are certain difficulties which have to be overcome; but when the process is properly carried out, the results are highly satisfactory. It requires special boilers and machinery, which cannot be transported to the place where the wood is to be used; and the transport of the treated wood entails loss of time and expense. Besides this, time must be allowed for drying after treatment. The working of the wood after treatment is difficult, as the oil is corrosive. The surface of the wood becomes tough; and if it has to be cut away, the exposed surface must be again treated. Piles which had been suitably treated and then driven in water had, after thirteen years' life, still in their pores the greater part of the oil. The life of all timbers is very largely increased. The tensile strength of untreated dry timber is always greater than that of untreated wet timber; and as the impregnation process drives out the moisture, the tensile strength of the treated wood is greater than that of the untreated timber. The Public Works Department have, therefore, decided to use impregnated wood upon all timber structures that may be built by them in water.

THE TEMPERATURE OF LUMINOUS FLAMES.

The temperature of luminous flames can be determined, says "Engineering," by two methods—either deduced from the laws of radiation or by measuring the temperature which is assumed by bodies introduced into the flame. But both these methods are open to objection.

In the latter method, our contemporary remarks, the objections are that heat is lost by the body through conduction and radiation, and that the body itself cools the flame into which it is introduced. To overcome the first objection, heat is imparted (generally by the electric current) to the body while in the flame, at the rate at which the heat is lost. The point is to determine the amount of heat required to establish stable conditions. This is possible in the case of the non-luminous flame of a bunsen burner, but not when the flame is self-luminous, because it contains glowing particles of carbon or of some other substance. Dr. H. Senftleben and Miss E. Benedicks, of Breslau, have, however, found a criterion which makes the electric-heat compensation method applicable for flames containing incandescent carbon particles. They argue that the carbon will only be deposited on the body introduced (mostly a wire), when the wire is colder than the flame. If the flame and wire are at the same temperature, there should be no deposition of soot—a questionable assertion; but the soot should at once appear, when the wire temperature falls below the flame temperature. Thus they regulate the temperature of the platinum (or gold) wire they use for their experiments until the soot deposition ceases; and at that moment they determine the "black" temperature of the wire by means of a Holborn-Kurlbaum pyrometer, and then find the "true" temperature of the wire from the known reflecting power of platinum at different temperatures.

Applying the method first to the Hefner standard candle (amyl-acetate lamp), they found a temperature of 1705° C. absolute, correct probably within 20°. In this determination, the influence of the radiating part of the flame between the instrument and the wire was, however, disregarded; but there is, on the other hand, an absorption of the radiation from the wire by this portion of the flame. The two factors would oppose one another. Senftleben considers that the influence is small, but that in the case of the Hefner candle the true temperature would probably be reduced by 1 p.ct.—*i.e.*, to 1690° C. absolute.

To study the further disturbing cooling influence of the introduction of the wire, they experimented with wires ranging in diameter from 0·2 mm. up to 1 mm. They observed a slight cooling influence only with the thick wires. Platinum and carbon are known to combine, however, at high temperature. Any direct influence of this combination was not observed; but it was found that, after using the same wire several times, the soot-deposition became less distinct.

Further, to investigate this point, they took gold wires instead of platinum wires—gold not being liable to carbide formation. In these experiments, ordinary oil-flames were also used, more or less sooty. In these sooty flames the temperature went down to 1150°, but the determination of the temperature of the Hefner candle gave the former value 1690° C. absolute. The influence of carbide formation likewise would, therefore, appear to be small. This value is also in fair agreement with other determinations previously made by Kurlbaum (1711°), Ladenburg (1688° and 1715° by different methods), Becher (1680°) for the temperature of the Hefner flame, and may thus be accepted. It should be noted that the temperatures stated are absolute. On the ordinary centigrade scale the melting point of platinum is assumed to be about 1783°.

A Continental contemporary points out that the great increase that has taken place in the use of gas for heating and cooking in Germany has led to an enormous demand for meters. While it has been found impossible to dispense entirely with the tin, copper, and antimony formerly used in their manufacture, the consumption of copper has been much redueed—*e.g.*, 50 grams of brass are made to serve instead of 2 kilograms.

It is reported that the problem of driving internal combustion motors by gas produced in generators using wood waste has been solved by a Swedish firm. In the large plants using wood waste, practically any kind of fuel can be employed—such as brushwood, branches, ground wood, sawdust, peat, &c. Wood tar is obtained as a bye-product. Gas-motor plants of this type are stated to be more economical than other types of power plant of corresponding capacity.

In a small book [published by Messrs. Methuen & Co., of Essex Street, W.C., price 1s. net], on "Present-Day Applications of Psychology, with Reference to Industry, Education, and Nervous Breakdown," Dr. Charles S. Myers, M.A., F.R.S., Director of the Psychological Laboratory, University of Cambridge, indicates in non-technical language the methods whereby a large increase in national efficiency is attainable through the application of psychological principles and tests. He gives various instances in industry where larger output, lessened fatigue, increased wages, and diminished cost have resulted from selecting employees according to their special aptitudes, reducing their hours of employment, interpolating proper periods of rest, and training the workers in the most economical movements and arrangements of their tools.

REGISTER OF PATENTS.

Manufacture of Cyanides and Ammonia. No. 12,946 (of 1915).

DEVAUCELLE, L. P., of Courbevoie, France, and BENSA, F., of Genoa, Italy.

Sept. 9, 1915. Convention date, Sept. 9, 1914.

The patentees claim: A "process of producing cyanide and ammonia involving the heating of a mixture of carbon and a material adapted to supply the base of the cyanide in a retort, and passing a current of nitrogen containing gas through the retort in which a cyanized mass is cooled to the desired temperature to enable it to be conveniently removed, or to be treated for the production of ammonia, while still subjected to the heating action of the furnace, by injecting into the retort cold gas in volume and at a velocity sufficient to effect the desired cooling, notwithstanding that heat is still being conveyed to the cyanized mass through the walls of the retort."

The operation of cyanization is effected as follows: When the agglomerated mass has been charged into the retorts, there takes place at first a distillation of the tars, pitches, or agglomerants that have been employed, as well as a partial pyrogeneous decomposition of the agglomerants. A certain amount of carbon becomes fixed; and the remainder of the agglomerant volatilizes and is recovered in drums and other devices provided for the purpose, either in the liquid or gaseous state. When the agglomerated mass has acquired the requisite temperature for cyanization—say, 1050° C.—nitrogen of the greatest possible purity is injected into the retorts. When it is judged that the cyanide has formed, the material contained in the retort is cooled by injecting through it a large volume of cold gas under a pressure of 30 cm. water column, at a velocity sufficient to cool the cyanized mass without materially cooling the retort—for instance, to 600° C., to prevent the formation of cyanate or the dissociation of the ammonia produced when water is brought into contact with the mass.

In order to produce ammonia, steam or water vapour is then injected into the mass, whereby ammonia is formed in accordance with the equation:

$$MCN + 2H_2O = MOH + CO + NH_3.$$

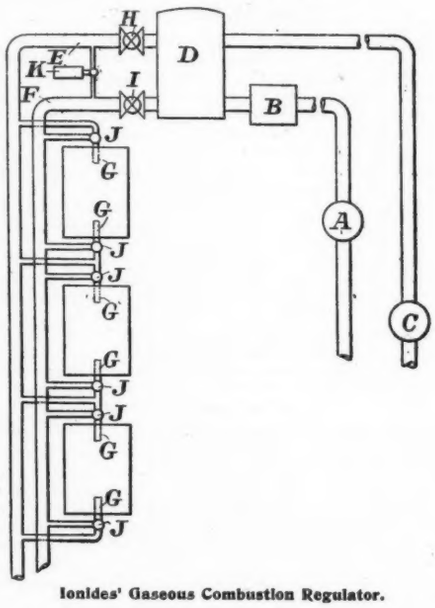
The ammonia produced is recovered in any suitable devices, and may be converted into any desired ammonium salt.

Gaseous Combustion.—No. 118,313.

IONIDES, A. C., JUN., of Porchester Terrace, W.

No. 11,891; Aug. 18, 1917. No. 16,806; Nov. 15, 1917.

This combined invention relates to gaseous combustion of the type in which a combustible gaseous fluid and supporter of combustion are both conveyed in separate conduits, at pressures bearing a constant relationship to one another, to the desired position, and mingled in the correct proportions prior to the combustion of the mixture. The object of the invention is to provide means for controlling a constant relatively low pressure gaseous fuel supply system.



Ionides' Gaseous Combustion Regulator.

In carrying the invention into effect in the form shown by the engraving, a supply of gas at any moderate pressure in excess of possible requirements is passed from a blower or continuous pressure creating device A through a gas governor B, so adjusted that some predetermined pressure within the limits of the supply pressure will not be exceeded. An air supply is provided by a blower or fan C at a pressure which will not be lower at any time than the governed pressure of the gas. The supplies of the two fluids are passed through a pressure-balancing device D, of the type described in patent No. 110,568, in which the movement of a sensitively balanced bell, diaphragm, or partition subjected upon opposite sides to the pressures of the air and gas, and floating in a liquid seal, operates statically-balanced or double-beat valves controlling the passage of the fluids through the apparatus.

The supply mains E F to a system of furnace or lighting burners G lead direct from the outlets of the pressure balance D, and upon these mains stop valves H I are provided; the adjustment being preferably made upon the air main alone by the valve H where the greatest niceness of adjustment is desired. The burners are fed by separate connections from both the gas and air mains—the proportions of the mixture being adjusted (in accordance with the relative pressures of the fluids) by orifices at the mixing point J, and the constituents being thoroughly mixed prior to reaching the ignition zone of the burner.

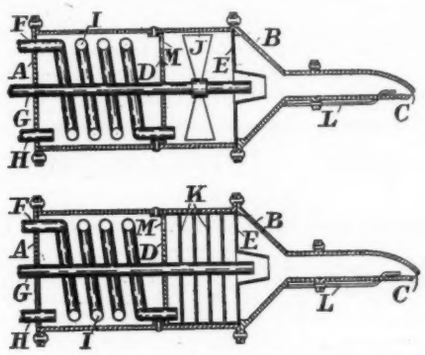
In such a system the gas governor B is so set that the predetermined gas pressure shall not be exceeded, and the pressure balance D is arranged to maintain equal pressures of, or any desired relationship within, the scope of the device between the pressures of the two fluids. Where the system comprises lights, one may be fixed to act as a guide or test flame K.

Burners.—No. 118,386.

BALFOUR, J. W. B., of Queen's Club Gardens, W., and CAMPBELL, D., of Streatham, S.W.

No. 2436; Feb. 11, 1918.

This invention relates to burners in connection with metallurgic and boiler furnaces, and is intended for the injection and combustion of pulverized coal or coke, tar, oil residues, crude petroleum oil, shale oil, and similar carbons or hydrocarbons.



Balfour and Campbell's Fuel-Gas Burner.

The burner consists of a cylindrical body made from mild steel having one end closed with a plate and the other closed with a cone-shaped cap terminating in a passage provided with a nozzle. The cylindrical body is divided transversely into compartments into which the fuel is forced under pressure, and containing means for heating the fuel (and vaporizing it in the case of liquid fuel), and also means for thoroughly mixing the fuel with preheated air and subsequently with steam. The resultant mixture is forced through the nozzle and ignited; the passage leading to the nozzle being provided with an auxiliary air supply in order to blow it out whenever necessary—thus preventing the nozzle from being choked up.

The burner (two forms of which are shown) consists of the cylindrical body closed at one end with the plate A and at the other end with the cone-shaped cap B, to which is attached a passage leading to the nozzle C. The body (with the cone-shaped cap) is divided into three compartments by plates D E. In the end plate A, provision is made for the entry of three pipes F G H, preferably of equal diameter and communicating—the pipe F with the fuel supply, the pipe G with the steam supply, and the pipe H with the air supply. The latter pipe terminates in the first compartment, while the pipe F is connected to one end of a spiral pipe I having one end communicating with the second compartment through an aperture in the plate D. The pipe G is extended axially throughout the length of the body, terminating inside the cone-shaped cap B. On it is mounted, in the second compartment, a rotary fan J.

In the second form shown, the fan is omitted, and a number of baffle plates K are inserted in the second compartment laterally one behind the other. The last partition plate E is in its centre shaped into a truncated cone placed over the end of the pipe G, and so arranged that it forms, with the pipe, an annular channel. The three pipes F G H are each provided with a control valve [not shown], for the purpose of regulating the supply through the pipes. To the air supply pipe is attached a branch pipe L extending along the outside of the body, into which it enters immediately behind the nozzle.

In operation, preheated air is injected into the first compartment through the pipe H. Traversing the compartment, the hot air comes in contact with the coil I (thoroughly heating it) and enters the second compartment through an aperture M in partition plate D. The fuel is forced under pressure through the pipe F and the coil, where it becomes heated and vaporized, if capable of vaporization, and issues into the second compartment. The force of the incoming fuel and air sets the fan J in motion, and, in rotating, the fan will cause the fuel and air to become thoroughly mixed. In the second arrangement, the fuel and air become intimately mixed in passing through the baffle-plates K. The mixture of fuel and air passes from the second compartment into the third compartment, and in so doing becomes mixed with superheated steam injected through the pipe G into the truncated cone. The final mixture of fuel, air, and steam now issues through the nozzle C, where it is ignited; the flame being spread and directed in any desired manner. The branch pipe L serves the twofold purpose of supplying additional air to the flame, should this be desired, and to blow out the nozzle when necessary—thus keeping the passage through the nozzle free and preventing it becoming choked up.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Sept. 18.]

Nos. 14,588—15,004.

BARGATE, A. F.—"Desulphurizing gaseous distillates." No. 14,955.
DESMOND, J. M.—See Bargate. No. 14,955.
FREW, D. L.—"Liquid-meters or indexes." No. 14,678.
HART, W.—"Suction-gas plants." No. 14,628.
HUTCHINS, T. W. S.—"Treating gases with liquids." No. 14,933.
JACKSON, G. J.—"Manufacture of gas in vertical retorts." No. 14,712.
LEVI, H.—"Combined reflector, heat-accumulator, and cooker for gas lights, &c." No. 14,821.
MUIRHEAD, A. E., J. G., & M. A.—"Heating and lighting, and apparatus therefor." No. 14,681.
STAFFORD, O. F.—"Destructive distillation of wood." No. 14,708.
WHITE, W. W.—"Distillation of solid carbonaceous material." No. 14,773.
WOODALL AND DUCKHAM.—"Manufacture of gas in vertical retorts." No. 14,712.

Furnaces for the Heat-Treatment of Metals.—In regard to the illustrated abstract on p. 490 of the "JOURNAL" for the 10th inst. of patent No. 117,903 of 1916, in the names of Sir Hallewell Rogers and Mr. C. M. Walter, it may (so as to prevent any possibility of misunderstanding) be stated that Sir Hallewell Rogers is not personally financially interested in the patent. His name merely appears as nominee of the Gas Committee in connection with any patents that may be taken out by Mr. Walter, who is Engineer-in-Charge of the Industrial Research Laboratory of the Birmingham Corporation.

LEGAL INTELLIGENCE.

CLAIM FOR PREPAYMENT METER RENT.

The Brynmawr and Blaina Gas Company were the plaintiffs, at Tredegar (Mon.) County Court last Tuesday, in four summonses in which they sued consumers of gas for 1s. 6d. each, being the rent of prepayment meters.

Mr. ST. JOHN F. WILLIAMS appeared for the Gas Company; the defendants were not legally represented.

It will be remembered [*ante*, p. 125] that the Company unsuccessfully sued a number of their consumers some time ago at the Blaina Police Court, with respect to the meter-rents for the March quarter. The defendants then raised the point that the notice given them had been very short, and that they had never acquiesced in the payment of meter-rent. The present summonses were with respect to the June quarter. Only one of the defendants appeared, and answered for the others as well.

Mr. WILLIAMS said that, though the amount was a small one, the cases were of importance to the Company, because the 1s. 6d. represented the sum which they charged users of gas in the district for the hire of prepayment meters. For some time the users of slot meters had been paying a sum per 1000 c.ft. which included the rent of the meter. Before the war, they were paying 4s. 9d. The charge was then put up to 5s., including the use of the meter; but owing to the increased cost of labour and materials, it was found necessary to raise it to the parliamentary statutory limit of 5s. per 1000 c.ft. exclusive of the hire of the meter. In accordance with their powers under the Act, the Company made a charge for prepayment meter hire, and decided that it should be at the rate of 1s. 6d. a quarter. They sent all the users of prepayment meters notice that this would be made from Jan. 1, 1918. The notices were dated Dec. 31; and the January quarter ended in March. Mr. Tucker, who had been using one of the prepayment slot-meters for a considerable number of years, paid the 1s. 6d. meter-rent in March. Another quarter's rent became due in June; and this was the quarter for which he now refused to pay, and for which the Company asked for judgment.

Mr. *Tucker* said he was Secretary of the local Trades and Labour Council; and, having considered the matter, this body thought there was an important point of law. He therefore asked for an adjournment, in order that he might have legal representation.

His HONOUR said defendants would have to pay the day's costs in any event.

Mr. *Tucker* pressed for an adjournment, and urged that the notice by the Company was only issued on Dec. 31—one day before it came into force. He thought that this could scarcely be construed as reasonable notice on which to terminate one contract and enter into another.

His HONOUR said defendant had taken all the force out of this argument by himself paying the bill for the first quarter. If it had been stated at the beginning of the March quarter that the defendants were going to refuse to take gas because there was not reasonable notice, there would have been something to consider.

Mr. *Tucker* said the first quarter's amount was not paid until May 16, and then only under protest. Following this, the case came before the Blaina Justices, and the Company were nonsuited. He then assumed he would not be called on to pay any further sums.

His HONOUR said this did not follow at all. Besides, there was no such thing as nonsuit in a police court. On the statement of Counsel, as to the provisions of the Act, it seemed to him (without prejudging the matter) that the Company were entitled to make a charge for the use of a meter. Defendants ought to consider seriously whether it was worth while to pay a considerable sum, in order to put the claim before the Court later in the year.

Mr. *Tucker* asked what would be the position of those who had not paid.

His HONOUR said that people who resisted the rent for the quarter ended March would find themselves in considerable difficulty in resisting, because the Act did not provide that the Company must give notice before charging rent. If they continued the use of the meters, it did not occur to him they would have an answer to the claim. The sum of 1s. 6d. a quarter did not seem out of the way.

Mr. WILLIAMS pointed out that at the Police Court the consumers were legally represented. He asked His Honour to say that he would grant an adjournment to the next Court; the defence not to be gone into unless the costs of the day were paid by that time.

On these terms, an adjournment was granted.

A Fine for Illicit Coal Profits.

At Liverpool, the New Moss Colliery Company and Messrs. H. S. Higginbottom & Co., coal merchants of that city, were charged before the Stipendiary Magistrate (Mr. Stuart Deacon), on fourteen informations, with having sold coal in 1917 at prices above the statutory limit. It was stated that on one transaction of 30,000 tons the illicit profit was estimated at £9750. For the defence, Mr. Ashton, K.C., argued that there had been no infringement of the Limitation of Coal Prices Act, and no profiteering. There were heavy losses in the year to which contracts related. In connection with a loss of £37,000, the claim had been acknowledged by the Coal Controller; and a cheque for £10,000 had been paid on account. The mines as worked by Mr. Higginbottom, when contrasted with the previous management, were in a general way a different business altogether. On the sale of the New Moss selected coal, the fact that there was more of rich coal and less of poor coal, justified the statement that there was an improvement in the quality of the coal of from 10 to 12 p.ct. Defendants' predecessors were not under the Coal Controller; and since the defendants had taken the mines over, the cost of working, wages, &c., had risen considerably. The colliery did not come within the Order, because there was no basis for comparison. Mr. Greaves Lord (who prosecuted on behalf of the Board of Trade) said it was quite impossible that Mr. Higginbottom ever once considered the provisions of the Coal Prices Limitation Act with a view to framing his prices upon it. He had suggested that he did consider them, and that he added 20 p.ct. for increased value. It was extraordinary that, when he was warned in 1916, after frequent complaints, never in a single letter had he put down the suggestion that he had taken the previous prices at the mine, and added 20 p.ct. for increased value. The Stipendiary said that, having heard the evidence tendered on behalf of Mr. Higginbottom (who was admittedly the person responsible not only for his own acts, but for those of the Company of which he was substantially the owner), he regretted to say that much of it was untrue. He had also come to the conclusion that Mr. Higginbottom had systematically and deliberately paid no attention to the provisions of the Act in question. On the eight summonses against the Company, fines amounting to £750 and £500 costs were imposed. Three of the summonses against Mr. Higginbottom were dismissed; and on the other three he was fined £1097, with £500 costs.

Dunedin Gas Supply.

The report of the Dunedin (N.Z.) City Council for 1917-18 states that the revenue of the Gas Department shows a considerable improvement, having increased by £4955. Of this amount, £1250 is due to the increased price charged for gas; and £2654 represents the increased output. The total revenue for the year amounted to £53,141. On the expenditure side, the cost of manufacture increased by £4849, of which £1278 is the result of the increased quantity of coal used, and £3148 represents the increased price paid for coal. There was a total increase in the working expenses of £5354. A comparison of the cost on the basis of pence per 1000 c.ft. sold, shows an increase in the cost of manufacturing of 4·9d.; while the total revenue exhibits an increase of 2·44d. The Committee had to face the heavy increases in costs of coal brought about by strikes in New Zealand and Australia, and by higher freightage. It was found impossible to maintain the selling price of gas at 5s. per 1000 c.ft.; and an increase, from September, of 5d. was decided upon. The works of the Caversham Gas Company which were bought by the Council in 1907, have, with the exception of the holder and the meter-house, been out of commission since that time. They have now been let for a term of years to a firm for an altogether different class of work.

Maximum Price at Ashbourne.—The Ashbourne Urban District Council have passed a resolution to ask for power from the Local Government Board to increase the charge for gas from 3s. 4d. to 4s. 7d. per 1000 c.ft. The Chairman of the Gas Committee (Mr. H. Coates) explained that, under the Council's Act, they could not charge more than 3s. 4d.; but the gas was now costing them 3s. 6d. per 1000 c.ft. to produce. If they were permitted to raise the price to 4s. 7d., it would mean an increase in their receipts of £1400, which would leave a deficit of £600 or £700 to be provided out of the current accounts of the Council.

The Coal Controller's Estimates.—Writing to "The Times" from the Vicarage, Aylesbury, the Rev. Victor L. Whitechurch says: The clergy have been asked by the Controller of Coal Mines to bring before their parishioners the shortage of coal and the need of economy. I am correspondent of two elementary schools in this parish. Last year they consumed 20 tons of coal and 35,000 c.ft. of gas and 22 tons of coal and 64,000 c.ft. of gas respectively. The local Coal Controller has just apportioned 54 tons of coal to the one and 57 tons to the other, and the same amount of gas in both schools. How can I preach economy at the request of officials while they behave in such an extraordinary manner?

MISCELLANEOUS NEWS.

A FUEL CONFERENCE.

Sir Albert Stanley on the Situation.

At the Mansion House in the City last Friday, Sir Albert Stanley, the President of the Board of Trade, had a friendly conference on the coal situation with the Mayors of the Metropolitan area and of the Home Counties. The meeting—over which the Lord Mayor (Sir C. A. Hanson, Bart.) presided—was highly gratifying in point of numbers, and of the obvious success the appeal of Sir Albert had in enlisting the sympathy of the civic representatives present in the task of making known in their communities the gravity of the coal situation; and the need which exists for every man and woman to be a fuel and lighting economist during the coming winter.

The LORD MAYOR, in his opening remarks, spoke of the serious difficulty in regard to fuel being not only of a national, but of an international, character. He also assured Sir Albert that he was meeting a body of men who were as determined as it was possible for men to be that, whatever sacrifices were necessary, whatever efforts were needful within the limitations of human power, those sacrifices and those efforts would be cheerfully made by them; and so far as they could induce others to make them, they would do so. Whatever were the difficulties, limitations, sufferings, and inconveniences of this country, he knew from recent personal experience that they were nothing compared with those of our Allies on the Continent.

THE NEED FOR FUEL RATIONING.

Sir ALBERT STANLEY, in the course of his address, said the coal position had been truly described as a grave problem—a problem which embraced the whole of the United Kingdom, and extended to every one of the belligerent and most of the neutral countries of the world. This war, as probably every big war did, brought very rapid and very startling changes. A new problem had appeared; and it vitally affected the nation. This particular problem resolved itself into, roundly speaking, a shortage of 36 million tons of coal. The demands, as they saw them now—those of this country, of our Allies, and of certain neutral countries—could not be met, on the present basis of output, to the extent of 36 million tons. How had this problem arisen? To find an answer, he must go back to March, when the German Armies were advancing on the Western Front. There was an immediate demand for more men for the Army; and one of the largest sources of man power was the coal miners. He had sufficient knowledge of the military situation to know what this meant. He did not shirk it. He knew what the withdrawal of 100,000 men from the coal mines meant. But under the circumstances he had no hesitancy. He agreed completely with the decision of the War Cabinet that the men should be withdrawn for military service. He knew that it involved for this country considerable hardship. He knew it meant the casting aside for some considerable period of any possibility of the continuance of that same degree of comfort that had been experienced up to that time. But this was not all the problem. The advance of the German Armies carried with it the impossibility of the French Government working certain of the coal mines that came within the battle area. This meant that France had to rely upon this country to supply her with more coal. Here was another burden of roundly about 6 million tons. France was to-day gravely in need of coal; and what was true of France was equally true of Italy—perhaps more so. For the whole of last winter the coal ration for France was only round about one-fifth of the ration that had been decided upon for each household in this country for the coming winter; and so at home no one should hesitate to make some sacrifice to meet the immediate needs of France. Italy had no coal at all for household purposes. Every ton of coal carried into that country was required for manufacture, and for meeting the immediate needs of the Army. Italy, owing to this serious shortage, was required to make sacrifices far greater and more serious than anything contemplated in this country up to the present time. He need make no excuse for agreeing that sacrifices must be made in this country in order that the allied countries might be continued in the war. Another aspect of the problem developed. Those present had read in the Press of the number of American soldiers that were being transported across the ocean. The majority of the ships used were British. They had no pool of ships to call upon to meet this new demand. The arrangement which secured the American soldiers by the hundreds of thousands in France was largely made by bringing into service ships from neutral countries. In exchange, they had to give the neutral countries the use of coal which this country required. There again a further burden had been imposed on the home resources. He had no doubt the question would immediately come to mind, Why should it be necessary, having this large number of American soldiers, for this severe strain to be placed upon the man power here? The American soldiers going into France were not being brought in with the object of replacing British soldiers, French soldiers, or Belgian soldiers. They were here so that there might be a speedy and lasting victory. It was useless to withdraw men from France, and simply to replace them by Americans.

THE SAVING, AND THE DEFICIT.

These things could not be done without sacrifice; and he asked that victory should be weighed against the discomfort arising from the shortage of coal. It was inevitable that this country had got to go through a really severe winter; but he believed they would pull through without anything like the discomfort and the hardship that had been experienced in France and Italy for more than one winter. What had to be done was to ration the country on a basis which would give each one a sufficiency of fuel so that there would be no real hardship. If they succeeded in saving the coal for which the scheme of rationing provided, they would be able to lay aside during the year 8 million tons of coal for other purposes. It was estimated that of all the coal mined in this country some 40 million tons were used for household purposes; and it was one-fifth of that coal that it was proposed to withdraw, and use elsewhere. It was hoped that, with the help of householders themselves, more saving than this would be shown. There remained a deficit of 28 million tons. This was the problem that confronted them.

MAN POWER AT THE MINES AND EFFICIENCY.

They had in the mines about 150,000 less men of all grades of service than were employed in them at the outbreak of the war. But 1,000,000 men had gone for military service. The difference between the two figures was made up by the natural inflow of boys and men. It would, however, be unfair to the men in the mines to measure their output by the loss of only 150,000 men. They could not take 400,000 men, and replace them by 250,000 less efficient boys and men, and produce the same results. He thought, however, it was possible for the miners to so improve the output that, with the economies in coal use, the deficit could be practically wiped out. Every single member of the Executive of the Miners' Federation had pledged himself to do all possible to encourage the men to increase their output. But they could not expect them to go on producing increased quantities of coal if it were only for the unnecessary comfort of the public. This was an additional reason—and he believed a vital reason—why, during the time the shortage existed, everybody using coal for whatever purpose should see that not a single pound was used that could in any way be avoided.

CO-OPERATION—EVERY MAN AND WOMAN A COAL CONTROLLER.

He therefore appealed to those present to help in this very difficult problem. If the people understood why this shortage had been caused, if they knew that they were making this sacrifice in the national interests, he was perfectly certain there would be the necessary co-operation to make the scheme a success. He asked those present to meet their people, and make the real facts of the position known. If the work of the Local Fuel Overseers was to be a success, they would need all the assistance they could get. The rationing of fuel was the most difficult of all rationing problems. It could not be rationed as food; and there was no possibility of issuing an Order that would cover every possible contingency. They had been accused of issuing a too elaborate Order. It was only because it was so difficult, because so many contingencies had to be provided for, that the Order was bound to be so elaborate. They must therefore to a very large extent depend upon the loyal support of every citizen to make the Order a success. He would appeal to everybody not to ask too much from those who had the responsibility of administering the Order. Let each one constitute himself or herself a coal controller.

SUBSTITUTES FOR HEATING AND LIGHTING.

He had heard from some quarters of attempts being made to find substitutes to maintain individual comfort against everybody else this winter. There was no surplus of anything in this country. They could not deny themselves one thing, and take liberally of others. When the people who were denied a part of their gas and electricity were trying to find substitutes, he would ask them to bear in mind that they were helping to create a serious shortage for those who found those substitutes an actual necessity. By evading the Order, and their own responsibilities, they would only be robbing someone to whom the substitute was an absolute need. There must be self-denial during the winter that was coming. If there was a general determination to make the scheme a success, he had no doubt they would carry it through as originally laid down.

THE GAS RATION PER TON—THE PRESIDENT EXPLAINS.

During the discussion that followed, it was suggested that, in view of the large number of American soldiers who had come over and were coming, the deficiency of miners could be made up from the men now at the front. The inadequacy of 15,000 c.ft. of gas in exchange for a ton of coal was voiced by more than one speaker—the Mayor of Kensington giving it as his view that, as there was ⅓ ton of coke (to say nothing of other bye-products) available for sale from the carbonization of coal, the householder was entitled to 28,000 to 30,000 c.ft. of gas in exchange for a ton of coal. In his opinion, it would be in the interests of both national economy and the national emergency if a larger amount of gas could be allowed per ton of coal.

Sir ALBERT STANLEY, in his reply to the discussion, said that they were proposing the return of 20,000 miners from the Army. Some of these were already at work. In America the demands for coal for next year would be greater by nearly 75 million tons than their output would provide; and it would be hardly proper to say that America should make these sacrifices and that this country should not. They had as difficult a problem to tackle as, if not a greater one than, was the case here. Bringing the American soldiers over to France should not result in a reduction in the strength of our own Army. As to the question of the supply of 15,000 c.ft. in lieu of 1 ton of coal, the average production per ton was something like 12,000 c.ft. If they could deal with gas, without regard to the provision made at gas-works for dealing with coal, and without regard to the character of the coal required, they could probably make a more liberal provision, and probably it would be wise to do it. But the difficulty was that gas-works must, to meet the present allowance, have a sufficient supply of coal; and this was already placing a tremendous strain on the railways, owing to existing conditions, and the position in which they were placed in regard to seaborne coal. Ships had to be taken away for use elsewhere, and the railways could not handle the extra coal. It was not simply as some people thought a question of transposing coal into gas, but a question of the transport of coal. This was the explanation of the limitation placed upon the equivalent. Ireland did not come within the rationing scheme; but the import of coal into Ireland would be limited by 25 p.ct.

During the discussion, it was asked why the price of coke was so high; but the question was not answered by Sir Albert, who might have replied that coke per pound is of almost equal calorific power to coal, and that in the main it consists of pure carbon.

Under proper conditions of use, it is of equal value to coal for heating purposes. For many heating purposes it is the preferable fuel.

A hearty vote of thanks was passed to Sir Albert Stanley and to the Lord Mayor.

GAS STRIKE AT HASTINGS.

An unfortunate position of affairs was revealed by a notice to the consumers on the 16th inst., in which Mr. C. F. Botley, the Engineer and General Manager of the Hastings and St. Leonards Gas Company, intimated that, the Company's employees having left their work, the supply of gas could not be maintained. Consumers were therefore requested to turn off the gas at the meter main-cock, and await further notice before turning it on again. It was added that every endeavour was being made to keep the manufacturing plant ready for resumption of work; but serious delay and inconvenience were inevitable. As a matter of fact, the supply, which was off on the Monday, was resumed on Friday, by which day men were back at work to await arbitration. The strike began on the Saturday, when the night gang did not go in. They took every man out, leaving furnaces, boilers, valves, &c.; and at midnight there were only Mr. Botley, his assistant, and three foremen to do everything.

The employees are already in receipt of a war bonus ranging from 17s. to 22s. per week; and difficulty arose over the 12½ p.ct. demand, which, on the instruction of the men, had been referred by their Union to the Ministry of Labour for arbitration. The Company agreed to this, and naturally took up the position that, having done so, they had no alternative but to await the result of the arbitration. To a local paper, Mr. Botley explained that the Directors could not go behind the steps which had been taken; and they were bound to abide by the decision of the arbitration. This was the whole point at issue; and if the men had continued their work, the matter would have been decided by arbitration, as originally agreed. The Ministry of Labour had stated that they would not arbitrate till the men were back at work, but that when they had returned the Ministry would do everything possible to expedite the matter. Mr. Botley also pointed out that the national award dealt with the whole question in sections; and the advance in wages which was decided upon was at once offered to the men, when their Union applied for it, and had been paid since the second week in July. This item alone meant £4000 a year to the Company, and was equal to an increase of 2½d. per 1000 c.ft. to the consumers, which meant a reduction of dividend for the unfortunate stockholders. It was important that everyone should realize that a demand beyond a certain point could not be immediately granted off-hand, when there were other interests besides those of the employees involved. Such matters must be considered from more than one point of view. The 12½ p.ct. did not largely apply to the Hastings Company, which was not controlled; and this was the point referred to arbitration.

On both sides efforts are being made to secure a speedy decision; and no difficulties have been placed in the way of constant conferences between the Company and the Union Organizer.

An Appeal to the Tribunal.

Before the rising of the Hastings Tribunal last Tuesday, Mr. J. J. Ford asked leave to call attention to a matter of public importance—the question of the gas strike. He said he understood that several of the men who had gone on strike had been given exemption because of their public work; and he wanted to know whether they should not go automatically into the Army.

Councillor Dr. Gray (Chairman) replied that in cases of conditional exemption, if the condition was broken by which they got exemption, the men were liable to be called up, and were liable as soon as they ceased to comply with the condition. This applied to anybody, not only gas men. When they ceased to carry out the condition, they were liable to report.

Captain Brandreth Gibbs (the National Service Representative) pointed out that most of the men of military age had protection from the Ministry of Munitions.

The Chairman said that in most cases they had protection certificates which Mr. Botley had obtained for them. There had been cases where the Tribunal had given exemption where he had not adjudicated because he was connected with the Company. Where there were protection certificates, they had to be withdrawn.

COMMITTEE ON PRODUCTION PROCEEDINGS.

The Committee on Production, which is the principal arbitration tribunal under the Munitions of War Acts for the determination of differences between employers and employed, was appointed, in its reconstituted form, on May 1, 1917; and there has been lately issued a memorandum that summarizes the work that was done by the Committee during the twelve months ended April 30 last.

The total number of awards issued by the Committee during this period was 1333; the average of 71 cases dealt with per month in the first half of the year increasing to 151 per month in the second half. Practically, all the principal trades and industries of the country were represented in the disputes referred to the Committee for settlement; and the cases dealt with included, of course, not only those referred to the Committee under the provisions of the Munitions of War Acts, but some in which the employers and workpeople concerned agreed voluntarily to refer their differences to them for settlement by arbitration. A large number of the awards have applied to whole trades; and in some of the principal trades there are now special agreements between the employers' federations and the trade unions which provide for periodical hearings, at which the Committee are called upon to review the general wages position. The first of these agreements was arrived at in February of last year, between the Engineering Employers' Federation and the fifty trade unions connected with the engineering and foundry trades; and it establishes a special procedure for the adjustment of wages during the war. Agreements on similar lines have since been entered into in connection with various industries, including the Chemical Employers' Federation and the unions related to the chemical and allied trades. With the work of the Committee which has special bearing upon the gas industry, "JOURNAL" readers are already aware.

The awards given under the agreements referred to by the Committee have become awards of general application, and have extended far beyond the particular trades for which they were first given. The effect of these national awards has, the memorandum declares, been to establish a general advance, as compared with pre-war rates, of not less than 20s. per week on time rates; the corresponding advance in the case of piece-workers being 13s. a week as a supplement to earnings, and 10 p.ct. on piece rates. In addition to these advances, earnings have in the case of a large number of trades been increased by grants of a bonus of 12½ p.ct. in the case of plain time workers, and 7½ p.ct. in the case of piece-workers and other workmen not paid at plain time rates. In certain instances, an advance has been given equivalent to the bonus. Since January, a large part of the activities of the Committee has been devoted to the settlement of disputes which have arisen in connection with the bonus.

Stockport Gas Workers.

In the case of the Stockport Corporation gas workers, the parties to the reference were the Corporation and the Municipal Employees' Association. The claim submitted on behalf of men and women employed in the Gas Department was for an increase on the war bonus that will raise it to a total war wage of 20s. per week. Representatives of the parties were heard on Sept. 10. The men concerned are meter inspectors and slot collectors. The women include workers in the gas-works and slot collectors. Male workers in the gas-works receive 20s. per week war wages and the 12½ p.ct. bonus. The men concerned receive 12s. per week war wages and the 12½ p.ct. bonus. The women concerned are paid at the men's rate—viz., 6¼d. per hour, working 44 hours instead of the 53 worked by men, and receive, in addition, 9s. per week war wages. The award of the Committee is in the following terms: The men concerned shall receive an advance of 8s. per week, increasing their war wages to 20s. per week. The women shall receive an advance of 4s. per week, increasing their war wages to 13s. per week. The amounts awarded are to be regarded as war advances, recognized as due to, and dependent upon, the existence of the abnormal conditions now prevailing in consequence of the war. The award shall take effect as from the first full pay following Sept. 14.

COMPRESSED GAS TRACTION FOR OMNIBUSES.

The experiments which have resulted in a number of the London General Omnibus Company's vehicles being equipped for gas traction were referred to in a recent issue of the "Tramway and Railway World;" and the following description [illustrated by sketches and photographs] was given of the equipment employed for the use of compressed gas. The arrangement, it should be noted, is being patented by the Company.

The compressed gas cylinders, which are charged to a maximum pressure of 1100 lbs. per sq. in. from a Reavell compressor, are placed under the longitudinal seats of the lower deck, and are completely cased-in. At first four cylinders were used; but the design adopted provides for only two—one under each seat, and of greater size. A pipe underneath the body connects the two cylinders. The latter are connected in parallel to a main reducing valve by a pipe of ⅜ in. internal bore. The main reducing valve is a combination of a cut-out and diaphragm valve. The high-pressure gas, after being reduced to approximately 2 lbs. per sq. in. pressure, passes through a secondary control valve into a flexible container, which performs the double function of an expansion chamber and diaphragm for actuating the control valve. The gas is carried from the expansion chamber by a pipe line, ½ in. external diameter, to a gas control valve connected to the carburetter of the engine.

When the expansion chamber is fully expanded, it actuates the valve-spindle of the secondary control valve, cutting off the supply, which is diverted through a bye-pass pipe into the diaphragm chamber of the reducing valve. This cuts off the main high-pressure supply. Immediately gas is emitted from the engine control valve, the expansion chamber becomes deflated, and releases the secondary control valve, which in turn releases the pressure on the diaphragm of the reducing valve, and allows for the continuance of the supply from the high-pressure storage. The whole system is thus entirely automatic, and calls for no manipulation or adjustment by the driver, who has merely to operate the foot pedal used in conjunction with the ordinary petrol carburetter. In case of emergency, a small auxiliary petrol tank is fitted; and the standard petrol carburetter is retained. To change-over, it is merely necessary to engage a small sliding dog to whichever throttle lever it is required to operate for running the engine on either liquid or gas fuel. The distinguishing feature of the equipment is that it is a combination of the high-pressure and low-pressure systems. While introducing the gas at high pressure and passing it out at low pressure, a means of expansion is provided which is very necessary after compression.

To come to details of construction, each compressed gas cylinder is of 9 c.ft. capacity, giving a storage of just over 600 c.ft. at a pressure of 1000 lbs. per sq. in. Thus each omnibus will carry gas which at normal pressure would occupy 1200 c.ft. This is sufficient for twenty omnibus miles. The cylinders are tested to 4000 lbs. per square inch by hydraulic pressure; so there is an ample margin of safety. They are of original design, and have been schemed-out on principles consistent with general engineering practice. The body

of the cylinders is of drawn copper tubing, 10 in. in diameter and 9 ft. in length. The copper body is fitted with steel end-plates, which take the form of a spigot-and-faucet joint, making a cramping joint on a radius formed on the ends of the copper tubing. The end-plates are supported by longitudinal steel stays held in place by steel nipples which have a conical jointing. The outside of the cylinder body is wound with three layers of gun-steel tape, $\frac{3}{16}$ in. by $\frac{1}{16}$ in. section, put on under high tension, on the same principle as gun winding. The object is to prevent bulging or sectional bursts. Any tendency to distort the cylinder under pressure will be in the form of elongation, the resistance to which is provided by the series of longitudinal steel stays. It is anticipated that copper tubing for the bodies of the cylinders will be replaced by steel tubing, when war conditions have so relaxed as to enable the latter to be procured. The advantage of this will be the reduction of the elongation effect on the body, and consequent reduction of tension on the stays. There will also be a slight reduction in weight.

It is also to be noted that the valves embodied in the system have been carefully designed to perform the functions found necessary with gas storage. To allow for free movement at very light pressure, stuffing-boxes on the valve-spindles have been replaced by grease-seals, and the sealing reinforced by rubber rings inserted in the under side of the valve-body.

Attention may be directed to the ingenious disposition of the apparatus, with the result that there is nothing in the way of external appearance to show that the omnibus is not an ordinary petrol-driven one. The reducing valve and the small petrol tank are under the driver's seat. The expansion chamber, which is a strong fabric container, is placed behind the usual front destination board above the hood. The box containing it is only about 6 in. wide from front to back. The bag is suspended in the box so that its weight has no effect on the automatic control of the gas supply.

For charging purposes, it is proposed to instal at the Cricklewood depôt of the Company a Reavell compresser of 15,000 c.ft. per hour capacity, connected to a battery of storage cylinders of approximately 30,000 c.ft. capacity, controlled by a hydraulic accumulator. The storage cylinders will be connected in parallel and cased in concrete. The hydraulic accumulator is employed to keep the pressure constant. The battery will be connected to a pipe-line, which will carry a series of charging pipes, from which several omnibuses can be charged at one time.

The change from petrol to gas power is being accompanied by a change in the method of lighting the omnibuses so converted. The gas-driven omnibuses will be lit by gas; and the apparatus will weigh only 22 lbs. Gas from the high-pressure cylinders is reduced to 10 lbs. per sq. in. by means of a reducing valve and governor. Each omnibus has seven incandescent gas-lights; the mantles being enclosed in silica shades. The gas is controlled by an injector system, which maintains uniformity of pressure and light; and the results are expected to be very good.

Hill-climbing tests were made on gradients as steep as 1 in 9. It was demonstrated that the power obtained from the engine on this system with gas fuel was equal to that obtainable when petrol fuel is employed. It was also shown that it was impossible to exhaust the supply system when the maximum engine output was being developed. The high-pressure system kept up the supply as required. This disposes of the idea that less power can be got from gas fuel than from petrol.

In appearance the vehicles, both externally and internally, are practically indistinguishable from the petrol-driven variety. The feed of gas is quite automatic. There is no additional mechanism for the driver to handle. The charging is even easier and quicker than the filling-up of petrol tanks. The power is all right; and there is every prospect that reliability, as proved by the test of time, will be satisfactory.

GAS AND THE FUEL AND LIGHTING ORDER.

The Aldershot Company's Campaign.

Evidence of the energetic manner in which the Aldershot Gas, Water, and District Lighting Company have been dealing with the situation created by the Household Fuel and Lighting Order is to be found in a series of advertisements inserted by them in the local Press, and a circular-letter which they have sent to every consumer. Examples of the advertisements are given below; and the circular is reproduced.

SUGGESTION OF A CORRESPONDENT.

In a letter written for the purpose of drawing our attention to the matter, a London correspondent says:

It occurs to me that if all gas companies throughout the country had dealt with this subject in the same way, it would have been brought home very clearly and pointedly to consumers exactly what the position was, and so have influenced them to requisition more gas for their domestic supplies. May I suggest that every gas undertaking should do the same thing? I consider that every gas consumer throughout the country should be circularized by his local undertaking somewhat on the lines of the Aldershot circular.

It hardly appears to me that sufficient lead has been given to the gas undertakings in pressing on them the importance of consolidating the interests of gas at this juncture. My own experience is that people are applying for a very large proportion of coal; and in some parts of the country we hear of wholesale requests for the disconnection and removal of gas-consuming appliances. This surely ought not to be the position, and is not what is desired by the Coal Controller, as emphasized by his recent statements.

It is not too late for all gas companies to do something of the sort, as a very large percentage of the people have not yet received their Forms F.H.F. 3.

Household Fuel and Lighting Order, 1918.

In accordance with the provisions of the above Order the following :: :: is the allowance for a :: ::

FIVE-ROOMED HOUSE

FUEL ALLOWANCE Per Annum:	LIGHTING ALLOWANCE Per Annum:
4½ Tons.	11,250 cubic ft. of Gas.

¶. 3 tons of Coke may be used in place of 2 tons of Coal and 15,000 cubic feet of Gas in place of 1 ton of Coal. When you receive Form F.H.F.3 see that it is filled up as under:—

GAS	-	33,750 cubic feet.
COKE	-	15 cwts.
COAL	-	2½ tons.

Information as to the allowance for any size house, and the most economical method of allocating same, will be given on application to the various Showrooms of the

Aldershot Gas, Water & District Lighting Company,

Chief Office and Showroom:—VICTORIA ROAD, ALDERSHOT.

Telephone—301 to 305, Private Branch Exchange. W. FISH, Secretary.

A SERIES OF ADVERTISEMENTS.

The advertisement reproduced deals with a five-roomed house; the varied portions of those relating to six-roomed and seven-roomed houses are as follows:

SIX-ROOMED HOUSE.

FUEL ALLOWANCE PER ANNUM,	LIGHTING ALLOWANCE PER ANNUM,
5 TONS.	11,250 C.FT. OF GAS.

Three tons of Coke may be used in place of 2 tons of Coal, and 15,000 c.ft. of Gas in place of a ton of Coal; and on this basis your ration will go further if taken as follows:

GAS	**41,250 c.ft.**
Coke	15 cwt.
Coal	2½ tons.

SEVEN-ROOMED HOUSE.

FUEL ALLOWANCE PER ANNUM,	LIGHTING ALLOWANCE PER ANNUM,
6 TONS.	15,000 C.FT. OF GAS.

Three tons of Coke may be used in place of 2 tons of Coal, and 15,000 c.ft. of Gas in place of 1 ton of Coal. When you receive Form F.H.F. 3, see that it is filled up as under:

GAS	**45,000 c.ft.**
Coke	1 ton 10 cwt.
Coal	3 tons.

THE CIRCULAR-LETTER.

The circular sent out to the consumers bore the heading "Household Fuel and Lighting Order, 1918," and was in these terms:

Owing to the "comb out" of miners, and in order to assist more than ever our Allies, who are not so well placed as we are, the Coal Controller has been compelled to ration the domestic user of coal. The objects of the Order are two-fold:

1.—TO SAVE COAL.
2.—TO SAVE TRANSPORT.

Every householder is allowed only a fixed amount of gas or electricity for "lighting" purposes, and a further quantity of "fuel" for heating and cooking, which may be taken in the shape of gas, electricity, coal, or coke, and is based on the number of rooms in the house.

In order to make the scheme run as smoothly as possible, and to cause the minimum of trouble to our consumers with the maximum of efficiency, we have worked out a number of examples of the most economical way of taking one's allowance, according to the size of house; and these we shall be most happy to supply, or to give any information required, on application being made. Our outdoor staff of inspectors, collectors, and fitters have also been specially tutored, and can clear up any difficulties or misapprehensions on the spot.

To the wasteful man, the Order may appear irksome; but with care and a proper allocation of the allowance between gas and coal—and this we will do for you—there is no need why everyone should not have at least a sufficient supply of heat and light for his wants.

REMEMBER THAT COAL MUST BE SAVED!!

In taking your maximum allowance as gas, you are not only providing yourself with a ready and economic heat value, with the absence

of attention to chimneys, dirty fireplaces. dust and ashes, and the consequent servant difficulty, but from each ton of coal converted into gas, in addition to providing a supply of light, for one slot-consumer for half-a-year, there is recovered 10 cwt. of coke, 10 gallons of tar, and about 20 lbs. of that valuable and much needed manure—sulphate of ammonia.

Don't worry about the Order. Let the Gas Company do the thinking for you. "Do your bit" by saving every possible ounce of coal and helping our Allies, especially the gallant French, whose coalfields are in the hands of the enemy.

PUBLIC SERVICE COMMISSIONS.

Their Relations to Gas Consumers and Companies.

An address has been delivered at Cleveland (Ohio) before the Section on Public Utility Law of the American Bar Association, by Mr. Walton Clark, for the purpose of giving those concerned in the administration of governmental bureaus provided to secure the development of the gas industry and the regulation of gas companies the ideas that the gas industry holds of the obligations of such bureaus to the public and to the gas companies, and of the proper methods of procedure in such regulation and development. The purpose he had in mind was not to inquire what Courts and Commissions had established as to the relations between public and public service corporations (gas companies in particular), but to consider what Courts and Commissions might reasonably be expected to establish in the intelligent performance of their duties—what they must establish to meet the obligations they had accepted. These obligations were to secure to the public good gas service at a reasonable price, and to the investor the profit that would be a fair return on his investment and induce others to invest.

Owners and employees of the public service industries are, said Mr. Clark, American citizens, having the same interest in the establishment and maintenance of correct principles of government, and the wise performance of all governmental functions, as have all other American citizens; and they necessarily look at the problems not only from the view-point of the operator of a public utility seeking opportunity to perform his function creditably and usefully, and of the investor in such a utility seeking to protect his investment, but also from that of the citizen seeking to establish and maintain the best ideals and forms of government, and in every way possible to strengthen the social fabric. The development and control of public utilities being a function of the State, and the State having power to delegate its functions, this function of development and control may be performed directly by the State or by such delegate—whether company, municipality, commission, or other—as the State selects or creates for the purpose. The Legislatures of the majority of the States of the Union have delegated this duty and authority to so-called Public Utility Commissions. The power of decision in matters of price of gas, quality of gas, character of service, raising of capital, issuance of securities, &c., so far as theretofore a function of gas companies generally, has been taken from them, and lodged in State Commissions. With this shift in power from company to commission, necessarily has occurred a corresponding shift in responsibility. Such State-Created Commissions are now in existence in about forty states and territories. The group of states having Commissions charged with full or with some lesser measure of control of gas companies, and with responsibility for the protection and extension of the gas industry, now includes all of the larger states, and contains about 80 p.ct. of the total population of the Union. Commissions are a fact; and the gas industry generally will admit that, where operated with intelligent good intent, they will afford a solution of the difficulties ever existent where a corporation has a monopoly of the supply of a necessity. The gas industry will do this without abatement of their claim that in the past they have properly ordered their affairs, and have been in the best sense public servants. Gas men, by their experiments, by their searching of the laws of Nature, by their canvassing, by their insistence and persistence in getting consumers to use appliances that would be useful to them and save them money, have so extended the sale and reduced the cost of gas, while greatly improving the quality, that they have been enabled to reduce the price per unit to 40 p.ct., or less, of what it was a generation ago. This is truly public service; and to the result there is no parallel in the history of industry. To-day, no factor more important than gas enters into the life of the urban population—except perhaps such as have to do directly with the health and peace of the community; and on these a well-ordered street-lighting system has a highly beneficial influence.

In the earlier years of the industry's life, the use of gas was almost exclusively for the production of light. "Candle power" was its most important quality. The industry's development has been coincident with that enormous extension of knowledge of physical science which has marked the last century. It has kept pace in growth and development toward scientific perfection with the general industrial movement of the century; and this development has brought gas very largely into fields of usefulness where its heating power is its most valuable characteristic. It has become, decade by decade, more important to the prosperity of communities. Since the beginning of this century, and mainly through the convenience and cheapness of gas as a heating agent, the industry has increased in importance as a social factor in measure greater probably than has any other industry. This largely has come through the introduction of gas for cooking and water heating to city kitchens, and particularly to the kitchens of people whose related women folk do the family cooking.

A little thought will convince one that the 360,000 gas-equipped kitchens in a single city must represent the release of a host of women from a large measure of the drudgery of their lives; but unless one has had definite information on the subject, one probably does not realize how great is the saving of time and labour. Careful observation justifies the statement that the use of gas for cooking and water heating saves an average of about one hour a day of the time of one woman or girl cook in each of 360,000 homes—one hour a day release from the duties of fire-building, coal-carrying, ash-removing, and the consequent cleaning of vessels, implements, and surroundings. And one hour per cook per day is over eighty years of twelve-hour days—eighty years of twelve-hour days of woman's disagreeable labour saved each day in one city by the use of gas-heated domestic appliances. Statesmen and economists must recognize this as certainly a factor of the highest importance, and as marking the continuance and extension of the industry as essential to the maintenance and development of the best condition of urban life. In this time of stress, with need in war work for every available hour and unit of energy, this eighty years of woman's hard and disagreeable labour economized per day in one city is an enormously valuable asset to the nation.

With the war, the gas industry has become the principal source of some of the most important raw materials of explosives. About 30 p.ct. of the hydrocarbon bases of the explosives now being used by America and her Allies are coming from gas manufacturing plants. Thus in war the industry contributes one of the necessities of the nation's protection, as at all times it supplies one of the comforts of modern domestic urban life. These two uses of gas, with their beneficent influence on women's lives and on the security of the nation, and with the economy of the material resources of the nation which are incident to them, clearly mark gas service as one of the necessities of modern life. It is not necessary to dwell upon the importance of gas as an illuminant in millions of homes and on thousands of miles of highways, and its wide and growing use as a labour and material economizing source of heat in scores of industries—many of them industries essential to the conduct of modern warfare.

This relation of the gas industry to the public good has come to full recognition in the United States only within the last quarter-of-a-century. The importance to the public welfare of ensuring its efficiency and prosperity, and these at the lowest possible cost to the user of gas, is now no longer a matter of debate. The realization of this importance to the public welfare has found most recent expression in the formation of State Commissions. The political history of the gas industry shows that, from its earliest days, the general effort of governmental bodies has been to secure the establishment and maintenance of the industry—however unwise and ungenerous has sometimes been governmental treatment of gas suppliers of apparent prosperity. The gas industry's political history is the story of governmental effort, first to establish, next to regulate by unelastic provisions and competition, and finally, through Commissions or so-called "sliding-scale" agreements, intelligently to develop and regulate the business of gas supply. The history of this governmental effort must be of interest to students of public utilities in their relation to government and to people.

Briefly and broadly, Mr. Clark then sketched the political history of the gas industry in Great Britain, in so far as that history has to do with the regulation and protection of gas companies and the encouragement of extension of gas service. America, he proceeded, in the main, escaped the evils of competition in gas supply in the earlier years of the industry; but this was not through intelligent governmental efforts at regulation and protection, and was at the cost of all the ills that come with the exercise of an unregulated *de jure* monopoly. Indifference on the part of the servants of the monopolistic corporation, neglect of effort on the part of the owners to reduce cost of service so long as dividends were earned, irritation born of suspicion of all this on the part of the buyer, and, worst of all, suspicion, and angry, unreasoning charges of dishonest metering—of these is unregulated monopoly the fruitful mother. It is to the credit of the men who controlled the American gas industry in the monopolistic days that there was little justification for charges of indifference and inefficiency—as there never was any justification for charges of dishonest metering.

As a factor in the development of home comfort and street safety the gas industry has had some pretty crude treatment. Yet the gas companies generally have been able to earn dividends, and the citizens have had good service. The effort of governing bodies, as directed toward gas undertakings, though often blundering, and sometimes vengeful, has generally had the right purpose—the purpose to secure and to continue, first, gas service; secondly, low-priced gas service; and, finally, high-grade gas service, at as low cost to the user as possible. Through such encouragement as has been given the industry, it has been sought to secure a measure of relief—easement of the labours of the people. The purpose at all periods, though not in all individual cases, has been the advancement of the general good. The methods too often have been harsh; almost uniformly, in America, they have been rigid. But now there is, in commission control, an elastic medium, uniting the corporation and the public interest; and from such control one may expect continued development of the great industry and the best practicable service to the public at the lowest possible cost. What must be done to insure the realization of this expectation is the problem in so far as one has to do with Public Utility Commissions, or with the operation of gas properties.

The answer has to do first with the provision of plant. Since the creation of Public Utility Commissions, endowed with sole power of control of rates and capitalization, the obligation of a gas company to be ready to supply gas to all in its territory willing to pay the cost of service, is no longer unqualified. It is obvious that, as the control of the character of service and price of gas have now been taken from the companies, the companies themselves cannot any longer create the conditions necessary to insure such profits as will invite capital to the enterprise. The obligation to provide a plant adequate to the demands that may be made upon it is now conditioned upon the opportunity being insured the company to earn and divide among its stockholders such profits as shall make its securities a desirable investment in a competitive money market. This opportunity is now dependent on Commission action. It is now therefore the duty of a Commission to determine and order that combination of character of service and price of gas which will be so prophetic of profits as to command the capital necessary to enable gas companies to meet the demands upon them. No man—present stockholder or other—is required, or may be forced, to provide the necessary capital; he must be persuaded. There is but one way to persuade him. It is to make the investment so attractive that capital will seek it. This is in the hands of the Commission. The combination of price and character of service established must

give promise of sufficient gross income to cover all operating expenses, to provide a sinking fund to restore all parts as they wear out, and to retire any parts that become obsolete or inadequate, and leave enough net reasonably to insure ability to pay upon the existing and proposed investment the rate of interest the money market at the moment demands from such investment.

It is impossible to determine universally applicable, or even generally applicable, standards of price, quality of product, and character of service best to be established—the combination which will give to the consumer the greatest benefit per dollar paid. The materials of manufacture available for use so differ in kind and cost throughout the country that standards of quality and price best suited for one state or city may be impracticable for another state or city; and costs of operation will vary with the volume of the business. But there are certain general principles governing these and other matters under Commission control and applicable to all situations.

Permanence of tenure should be assured to gas companies. A company of limited life must provide from its earnings a fund to retire at the end of its life all investments made in its property less its prospective selling value; and this provision will correspondingly increase the cost of gas. The selfish interest of each gas company should be enlisted in the effort for low rates and good service. The public interest in this extends beyond the class of gas consumers; for a low selling price means a low cost, and a low cost means the conservation of the human and material resources of the nation. In the general interest, there should be the establishment of such standards of quality and service as will permit the widest selection of materials and methods of manufacture practicable for the locality, and leave the broadest possible scope for the exercise of engineering skill. This will also tend to national conservation, as well as to reduction of costs. Character of product and quality of service should be established, under penalties sufficiently heavy to insure compliance; and systems of inspection under competent men should be established adequate to the detection of violations of established regulations. Established selling prices must be sufficient to permit such a margin of divisible profit as will insure further investment as needed in a competitive money market. When a gas company seeks to raise new capital for additions or betterments of its plant, it should be compelled to show the necessity of the proposed expenditures, and that each dollar of new investment made and securities issued will add a dollar of value to the property.

Further than this, regulation should not go. These things having been established, it should be left for the company to work out its own salvation; and it will be found to the general good to encourage hope in the gas man's breast, and to permit special effort and special efficiency to reap a special reward, as under the sliding-scale. It is by leaving with the corporation officials all the latitude consistent with the enforcement of regulations as to standards and rates—all possible initiative, all possible hope of coincidentally serving stockholders and public—that the best and ablest men will be attracted to the service, and the lowest rates assured to the consumer.

After the Commission have decided what rate per cent. of profit is necessary to do justice to present investment and to ensure future investment, the next step will be the determination of the amount upon which this rate is to be earned. This step is generally called the "valuation" of the property; and it must be taken as one of the preliminaries to the final step—fixing the price. The most practicable way of fixing the amount upon which the determined rate of interest shall be earned is by inventory, and by valuation of inventory, part by part.

Mr. Clark then proceeded to give briefly his ideas on some of the items in the valuation of a gas property; and he afterwards touched upon the duty of State Gas Commissions to the public and to the gas industry, as affected by the unprecedented conditions created by the great war. It is, he said, an unusual condition, and calls for unusual treatment. The logical remedy appears to be in line with precedents already established—the arbitrary fixing of rates and standards as a war measure by the war-making authority, the Federal Government. One of the measures requisite for the successful prosecution of the war is the maintenance of necessary industries. The gas industry is essential to the development of the full power of the nation. It cannot be maintained without immediate and radical changes in standards or rates, or both. It cannot be extended to meet the increased demands of war times without assistance. The military importance of maintaining the credit of public service industries in this time of war is recognized by Hon. John Skelton Williams, Comptroller of the Currency, who in his annual report to the Congress says:

> The corporations referred to supply light, heat, power, and electric railway transportation for passengers and freight. They touch intimately the daily life of the people. . . . Now they are threatened with ruin. If they are allowed to sink into inefficiency, much of the most important war work of the Government will be crippled or paralyzed. . . . It is essential that forbearance and consideration be exercised by the State Commissions and municipal authorities, and that the corporations also be permitted to make such additions to their charges for service as will keep in them the breath of solvency, protect their owners against unjust loss, and give them a basis of credit on which they may obtain the funds with which to meet the strain put on them by the Government's needs. The breaking-down of these corporations would be a national calamity.
>
> Because of the gravity of the situation in this regard, I am moved to ask for it the careful attention of the Congress and the public. I am impressed with the importance of early consideration by the Congress of some measure to provide directly or indirectly for advance of funds on some conservative basis to such of these corporations as need help most urgently, so that they can give adequate service to the Government. The remedy would be unusual; but the times are unusual.

Communications follow, to much the same effect, from President Wilson and Secretary M'Adoo.

In the concluding sentences of the address, Mr. Clark remarked that

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the dignity of the office of Commissioner in control of an industry must be in proportion to the importance of the industry's part in the life of the people. A call to take on the duties of a Public Utility Commissioner is a call to an obligation to protect, develop, and regulate an industry vast and important to the citizen and to the State. It is a call to a position of great dignity, and of the highest potential usefulness.

HYDRO-ELECTRIC SCHEMES AND THE GAS INDUSTRY.

A New Zealand Report.

The Auckland (New Zealand) Gas Company, Ltd., have had printed in pamphlet form, for the benefit of the shareholders, a report made by Mr. James Lowe, their Engineer and Manager, on the hydro-electric schemes of the Government, from the point of view of the possible effect of their competition upon the gas industry.

The report is preceded by a statement by Mr. J. H. Upton (the Chairman of the Company), in which he says that the Public Works Statement for 1917 has supplied definite information regarding the Lake Coleridge scheme, upon which Mr. Lowe has been able to base reliable calculations showing the results that may be anticipated from similar enterprises in other parts of New Zealand, if the Government should be unwisely induced to borrow large sums of money for such works, when the country stands in urgent need of railways and roads for the opening up of virgin lands and the promotion of settlement. Lake Coleridge was selected from among all the hydro-electric schemes submitted for consideration by the Government, as being the one which promised the best results from the smallest outlay of capital; and the comparison which Mr. Lowe institutes between the practical working-out of this scheme and the proposed supply of electricity from Arapuni, as recommended by the Chief Electrical Engineer, is very instructive, and, so far as gas investments are concerned, very reassuring. The first outstanding fact to which Mr. Lowe's report directs attention is the proof which the official returns afford that electricity for lighting and power cannot be supplied to consumers in Auckland at lower rates than are already current in the city, if State enterprises of this description are to be placed on a self-supporting basis. It is clearly shown that the competition which gas enterprises in Auckland may anticipate in the future can be no greater than that which the Auckland Gas Company are now sustaining with a steadily growing business. Of the gas sold in Auckland, 60 p.ct. is for cooking; and the cost of heating by electricity is about 9½ times that of gas. In other words, consumers can purchase for less than ½d. as much heat in the form of gas as would cost them at least 4d. if produced by electricity. The facts quoted by Mr. Lowe regarding the successful competition of gas against electricity in Toronto (Canada) and Bergen (Norway) are of especial importance, because the hydro-electric services which supply these cities are among the most up-to-date in the world. The official figures in Mr. Lowe's report, showing that the capital outlay on the Lake Coleridge scheme greatly exceeded the estimate—the estimated cost was £23 2s. per H.P., whereas the actual cost has been £45 8s. per H.P.—are significant of what New Zealand may expect in future, if similar schemes are authorized.

Mr. Lowe, discussing the Lake Coleridge scheme, says the average price per unit of electricity sold for the year 1917 was 0·427d., and the cost per unit to the undertaking 0·673d.; while it appears that, even under the most favourable circumstances, an average price of ½d. per unit would not be sufficient to make the concern self-supporting, if all legitimate charges were met. As to the proposed hydro-electric station at Arapuni Gorge, on the Waikato River, if the actual cost exceeds the estimate in the same ratio as has been found to be the case with the Lake Coleridge plant, the average price per unit, in order to make ends meet, without rates, taxes, and management charges, will require to be in the neighbourhood of 0·8d., for a development of not less than 30,000 H.P. No advantage would be obtained by the electricity consumers in Auckland City (unless the Government sold the current at a price much below the cost of production) by the Council taking a bulk supply of energy from the hydro-electric installation, instead of generating it at their own steam-driven station.

Current is, Mr. Lowe remarks, sold by the City Council for power purposes at various rates below the average cost of production; the lowest published rate being for large consumers 1¾d. per unit for the first 25,000 units per quarter, and 1d. per unit for all units in excess of this quantity. The price reductions to power users are based on the consideration that they take the current principally in the day time, when the generating plant and mains would otherwise be lying idle, and that, consequently, anything obtained per unit from the power user more than the costs of generation and distribution is profit. The lighting consumer is saddled with the whole charges, including interest on capital expenditure for both classes of consumers. At the present time, 60 p.ct. of the gas sold is for cooking; and the chief cooking load occurs between 5 p.m. and 7 p.m. The cooking demand for gas at lunch time and breakfast time is considerable, but is greatly exceeded by the demand at dinner time. At the latter time gas is required for cooking at the rate of 230,000 c.ft. per hour. To obtain the same amount of heat from electricity, 48,342 H.P. would be needed. This heat is required through the greater part of the year during the chief lighting hours. Consequently, if electricity were employed for this purpose, the plant would have to be capable of generating, and the distributing mains would require to be capable of carrying, this amount of current in addition to the current required for lighting. The load factor would thus be reduced, and all charges per unit sold increased; and electricity for cooking would require to be sold at a price which would include its due proportion of all charges. A consideration of these points makes it clear that it would be ruinous for an electric

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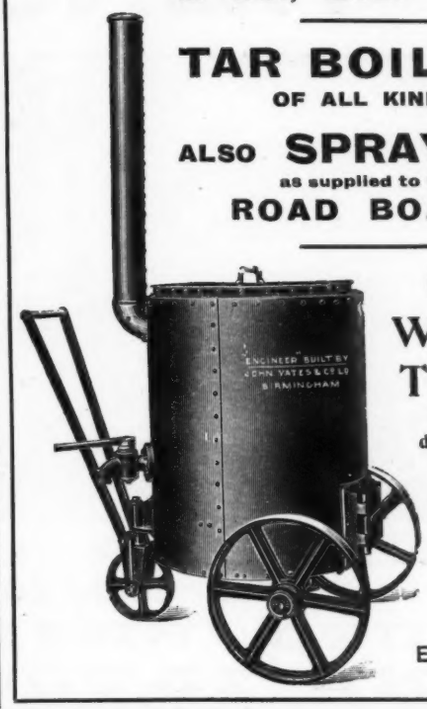

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station to sell a preponderance of its output for cooking purposes at prices approaching power rates. In fact, it looks as though the price per unit for such business should approximate to the price charged for lighting. It would certainly have to be considerably more than the average price already given.

The report includes some quotations from the paper which Mr. B. Schieldrop, of Bergen, read before the Institution of Gas Engineers in 1914, and his reply to the discussion, showing that, in keen competition with exceedingly cheap electricity generated from water power, gas consumption in Norway continued rapidly to increase.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 23.

Pitch continues firm at not below the price last mentioned—namely, 65s. per ton net *ex* makers' works. The article is in good demand, and shipments are being made regularly. Other products continue without change, being principally under Government control.

Sulphate of ammonia is in demand, and all available supplies are being regularly taken up.

Tar Products in the Provinces.

Sept. 23.

The average values for gas-works products during the week were: Gas-works coal tar, 30s. to 34s. Pitch, East Coast, 40s. to 42s. per ton; West Coast—Manchester 28s. to 30s., Liverpool 28s. to 30s., Clyde 28s. to 30s. nominal. Benzol 90 p.ct., North, 10d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8½d. Solvent naphtha, naked, North, 2s. 8d. to 2s. 9d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North. 4d. to 4¼d. Heavy oils, in bulk, North, 4¾d. to 5d. Carbolic acid, 60 p.ct. East and West Coasts, 2s. 6d. naked, nominal. Naphthalene salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products, for the month of August was 38s. 1d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

Markets are very firm, and show several good features. The Continental demand for pitch is still very strong, and up to 65s. per ton is asked by London makers. Provincial quotations are on the up-grade, as the result of a very fair volume of inquiries. These, although not producing much actual business, have been instrumental in bringing about a gradual, but fairly consistent, advance in prices—as much as 40s. per ton f.o.b. having been reported. Railway transport to London still creates difficulty, and as yet only very small quantities have been dispatched from East Coast ports on account of the lack of shipping facilities. Whether the Continental demand will be maintained is a matter which only the future can decide. Crude tar sales to distillers—for long a subject of controversy—are in process of revision. The Manchester fixture for crude tar is 37s. 3d. per ton. Cresylic acid still remains at 3s. 3d. to 3s. 6d. per gallon, casks included. Solvent naphtha pursues its erratic course; and while Provincial sellers are quoting from 2s. 9d. to 3s. 3d. per gallon, London makers are obtaining up to 4s. per gallon, drums included. The latter quotation is probably the more correct one. Heavy naphtha is fairly well maintained at 3s. 3d. to 3s. 6d. per gallon. Naphthalenes present no special features; refined being unchanged at £28 per ton, while crudes exhibit the usual wide range from £6 10s. to £14 10s., according to quality. Benzol and toluol are unchanged, going into consumption as fast as produced. Aniline oil is 1s. 2d. per lb. Anthracene makes about 6d. per unit per cwt.; there being a good demand for pure sorts, which should continue. Much interest still centres in carbolic acid. There is no real change in the position of crude 60's, although in some isolated cases up to 3s. per gallon has been asked. Crystals for export, however, have advanced, and prices varying from 1s. 8d. up to 2s. have been reported. Makers of the latter are anxious to obtain as much crude at the agreed price of 2s. 6d. as possible; but sellers of crude at this price are now few. Probably some alteration will be made next month, and business become easier to arrange. Tar products to the value of £206,967 were exported during August.

The range of quotations is as follows:

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 2s. 6d. per gallon; crystals 40% 1s. 2d. per lb.

Crude Tar: London 32s. 6d. to 35s.; Midlands 27s. to 29s.; North 28s. to 30s. per ton *ex* works.

Pitch: London 57s. 6d. f.o.b. works; East Coast, 33s. f.o.b.; West Coast, 32s. to 33s. f.a.s.; Manchester, 32s. 6d. upwards; Clyde 32s. to 33s.; South Wales 42s.

Solvent Naphtha: London 3s. 3d. to 4s.; North and Midlands 3s. to 3s. 6d. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6½d. to 6¾d.

Naphthalene: Refined £28 per ton nominal; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4½d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4⅜d. per gallon); heavy oil, 4¼d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

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Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Very little fresh news is to be noted in connection with sulphate. During August over 5000 tons were exported, bringing the aggregate for eight months of the year to just over 11,870 tons. Supply is still below demand, and no information is forthcoming as to how the shortage is to be made up—in fact, the position is becoming so aggravated by the coal restrictions that the trade could now be readily interested in synthetic processes if only the authorities would publish some record of success achieved and the cost of production under the modified Haber process, which is reported to have been adopted. The matter is of considerable interest to the trade as bearing on the future position of ammonium sulphate.

Manchester and the Gas Rationing Order.

Alderman W. Kay, J.P., presided at a meeting of the Manchester Gas Committee held last Friday, at which was unanimously passed a resolution recommending that the Household Fuel and Lighting Order, 1918, so far as it applies to gas, should not come into operation until Oct. 1, instead of (as it stands at present) being retrospective from July 1. The resolution, which has been forwarded to the Coal Controller, goes on to say that: "The public are only just beginning to understand the requirements of the Order, and have not had the information necessary to regulate their consumption." Mr. Fredk. A. Price (the Superintendent of the Gas Department) alluded to protests by consumers that had appeared in the local Press, pointing out that they had already burnt a large part of their "ration," because they were not made acquainted with the details of the Order until several weeks after the date on which it began to operate. Mr. David P. Davies, a well-known Manchester accountant, and the parliamentary candidate for Hyde at the recent bye-election, last week wrote to the newspapers stating that he found he had, in one quarter, burnt the whole of his "ration" for the twelve months.

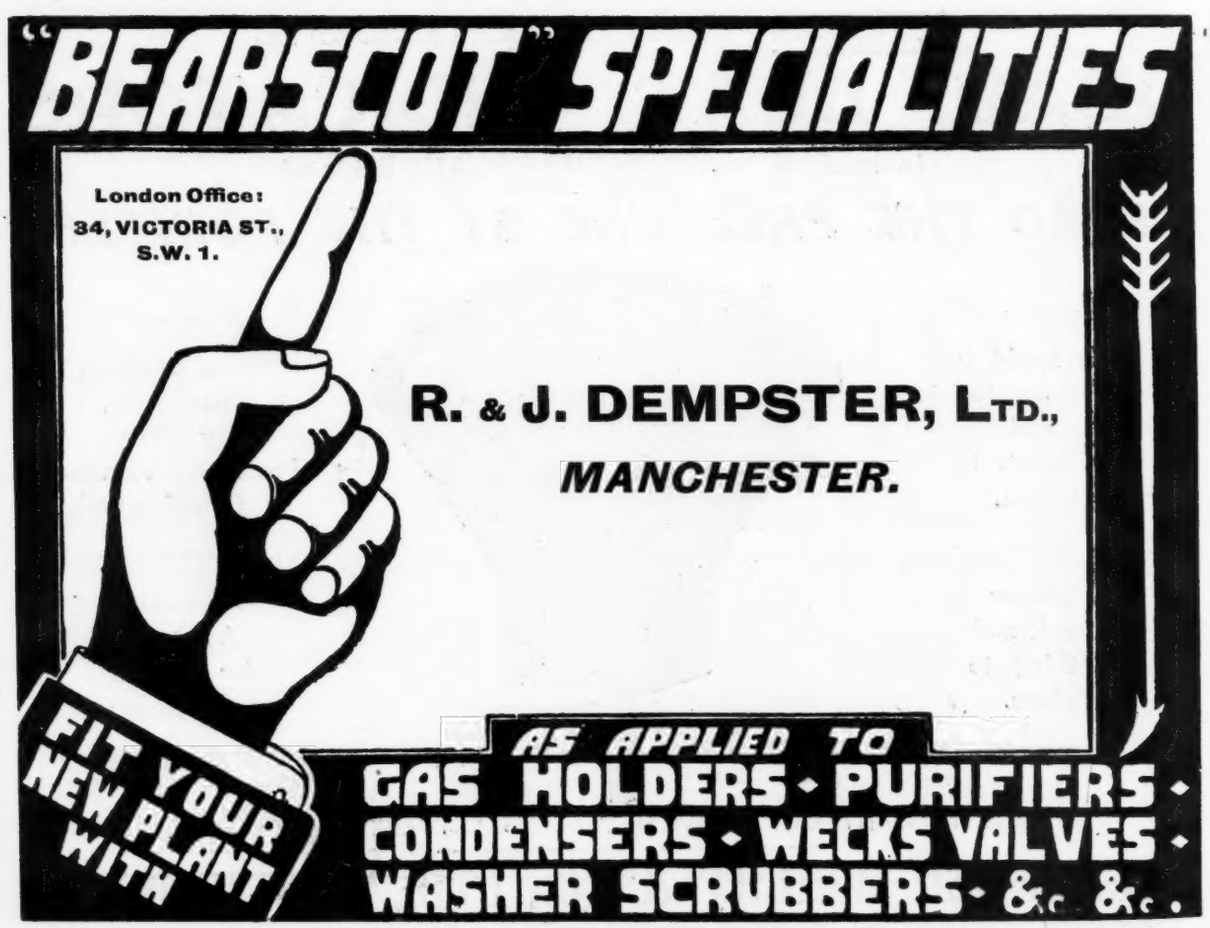
Bexhill Water and Gas Company.—The Directors regret that, for the first time since the commencement of the war, it has become necessary, owing to the diminished profits (brought about by increased costs), to reduce the dividend. The accounts for the half year ended June 30 show a balance at credit of profit and loss account available for division of £6463. The Directors recommend that a dividend be declared for the six months at the rate of 4 p.ct. per annum on the capital authorized by the 1885 and 1892 Acts, at the rate of £2 16s. p.ct. per annum on the capital authorized by the Act of 1896, the Order of 1901, and the Act of 1904, and at the rate of 5 p.ct. per annum on the preference share capital, less income-tax. This, with income-tax, will absorb £2787, leaving £3676 to be carried forward.

The Household Fuel Problem.

In an article dealing with the coal problem, the "Spectator" says: There is no question that a far greater aggregate value can be obtained from coal by first distilling it in gas-works, and then burning the gas, than by burning the coal direct. Yet if the householder, for the sake of securing this national economy in the most valuable raw material with which Nature has endowed Great Britain, burns gas all through the day instead of coal, he will find himself considerably out of pocket. Does this mean that the necessary cost involved in distilling the coal and conveying the gas by pipes is so great as more than to counterbalance the economy in material? Or does it mean that the gas companies charge to the consumer of gas an unduly high percentage of the cost of distilling coal, and an unduly low percentage to the selling-price of the bye-products? There is some reason to believe that the latter hypothesis has not yet been sufficiently taken into account. It must be remembered that the gas companies, when they started their industry about a hundred years ago, had no object in view except to get gas and sell it at a paying price. For many decades the refuse from gas-works was looked upon as a waste product; and contractors were paid to carry it away and dump it down anywhere. This experience has probably fixed in the minds of all gas companies the conception that the price charged to the consumer of gas must be looked upon as the prime source of revenue to meet the expenses of the company. The question now to be considered is whether this attitude ought not to be reversed, and whether the gas companies should not look to the sale of bye-products as a principal source of revenue, and should therefore sell gas at a relatively low price in order to stimulate consumption. The matter is one of immediate urgency; and as the Government now apparently have the power to control the price of everything, it may be suggested that there should be a complete revision of the price of gas as compared with the prices of other products of coal distillation. The only other alternative is for the State to impose a heavy tax upon coal burnt crudely in domestic grates; and this is a proposition which would certainly be resisted by the majority of poorer householders, and therefore may be regarded at the present time as politically out of the question. There remains the possibility of treating coke in such a way as to render it a more attractive fuel.

Price of Gas at Exeter.—The price of gas at Exeter is to be increased 3d. per 1000 c.ft. at Michaelmas. The advance will apply both to ordinary and prepayment consumers.

Bravery of Birmingham Gas Workers.—The Royal Humane Society have awarded bronze medals and certificates to J. Downes, J. Floyd, S. Buxton, T. Cotterell, and W. Lowe, all employed at the Adderley Street Gas-Works, Birmingham, for great gallantry on July 15. They succeeded, as reported at the time, in saving a fellow workman named Arthur Hodnett, who was rendered unconscious by an escape of gas in a holder-tank in which he was at work. Cotterell and Downes were overcome by the gas.



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5, Oxendon Street, LEICESTER.
John Street, Booth Street West, MANCHESTER, S.W.

Increase in Price at Stanley.—It is announced by the Stanley and District Gas Company that a further rise in cost of coal and materials renders it necessary to increase the price of gas 6d. per 1000 c.ft. to consumers by ordinary meter, making it 5s. 6d. A rent of 1s. per quarter will be charged for slot meters.

Price of Gas at Hull.—From the reading of the meters for the Michaelmas quarter, the British Gas Light Company at Hull announce that the price of gas will be increased from 2s. 8d. to 3s. 2d. per 1000 c.ft. This is the fourth advance made since the outbreak of the war, and represents a total increase of 1s. 4d.

Coal for Steam Plants.—As the result of an inquiry by the Coal Control Technical Department, it is clear that a great deal of preventible waste of coal is going on. There are 45,000 users of steam plant in Great Britain; and it is estimated that a saving of approximately 106,000 tons can be effected without any serious alteration to plant.

Dunfermline Gas-Works' Estimates.—At a Town Council meeting in Dunfermline, Provost Campbell said the new Gas Manager (Mr. James Campbell) had revised the year's estimates. The anticipated surplus for the year was £3044. It would, the Provost stated further, be a highly dangerous thing, in the condition in which matters were, to allow the present price of gas to continue. He had impressed upon the Manager the necessity of having the gas-works put into good up-to-date condition.

An Intermittent Gas Supply.—Writing to the Editor of the "Yorkshire Herald," complaining of the condition of the gas supply in York, Kate Adamson asks: Do not you think a system could be put in hand by which residents could have a reasonable supply of gas (say) about mid-day, for the preparation of meals, and also in the early morning, even if the supply were cut off from 9 to 11 a.m. and between 2 and 5 in the afternoon? Surely it is a matter of momentous interest which requires immediate attention.

A Fractured Main at Leeds.—On Thursday morning it was found that four people at Leeds had been seriously affected by gas which had penetrated into their houses from a fractured main under the street. A strong smell had been noticed in the neighbourhood the previous night; but no success attended examinations in the houses for escapes. An old-age pensioner, Mrs. Sarah Johnson, was found unconscious in bed, and was removed to the infirmary in a serious condition. The other persons are recovering satisfactorily.

Skipton Coal Supply.—The Skipton District Council have had a serious conference on the question of local coal supply. The stock at the gas-works was stated to be scarcely enough for a month. Most of the houses in the town have little coal storage room; and the Council decided to try to secure 400 to 500 tons of coal to be reserved at the gas-works in case of local need. Doubts arose as to whether this would now be permissible, in view of the Fuel Order; but the Local Fuel Overseer has intimated that the Council are quite in order.

Synthetic Coal.—The Synthetic Coal Syndicate, Ltd., has been registered as a private Company, with a nominal capital of £15,000, in £1 shares, to acquire the right to "any inventions or secret processes," and to carry on the business indicated by the title. The registered office is at No. 63, Queen Victoria Street, E.C.

Fire at the Heywood Gas Offices.—A fire was discovered about 8 p.m. last Thursday, in the upper storey of the offices at the Heywood Corporation Gas-Works. Information was sent to the fire station, and the brigade turned out. On arriving, however, they found that the fire had been extinguished by employees of the gas undertaking. The damage was only slight.

Dublin Gas Workers' Threat.—Some 1200 employees of the Alliance and Dublin Consumers' Gas Company had threatened to strike last week-end if a total increase of 28s. 6d. per week on pre-war wages were not granted. The men declined arbitration; and a meeting was arranged for yesterday (Monday), at which it was expected steps would be taken to avert any stoppage of work.

No decision has been come to at Portsoy whether to introduce coal gas or continue with acetylene lighting. The general desire is to have an installation of coal gas.

At Halifax, on Monday of last week, Daniel Beevers, a gas stoker, was fined £2, with the alternative of 28 days' imprisonment, for stealing 77 lbs. of coal, valued at 2s., from the Elland Gas-Works, where he was employed.

The Directors of the Bombay Gas Company announce that, with the object of equalizing the half-yearly payment of dividends, they have decided to declare an interim half-yearly dividend at the rate of 8 p.c. per annum, less income-tax.

The Birmingham Gas Department were responsible for a picturesque and informing tableau in Saturday's Win-the-War Day Demonstration in that city. It showed at a glance what the great gas undertakings are doing in the prosecution of the war.

An address on "Commerce and Industry after the War" will be given by the Right Hon. Sir Albert Stanley, M.P., President of the Board of Trade, in the Saddlers' Hall, Cheapside, on Wednesday, Oct. 2. It will be the first of a series of lectures arranged by the Industrial Reconstruction Council; and applications for tickets should be made to the Secretary of the Council, at Nos. 2 and 4, Tudor Street, E.C.4.

The first number of the "Industrial League Journal" (dated September) contains a "Foreword" by the Right Hon. G. H. Roberts, M.P., Minister of Labour, who refers to the work of the Whitley Committee. The address of the Journal is No. 56, Victoria Street, S.W.1; and the price is 6d. The Industrial League exists for the sole purpose of endeavouring to pave the way for a better relationship between employer and employed.

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THE POSITIVE DRY PREPAYMENT METER

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Darwen and Oldham Gas Prices Raised.—The Darwen Gas Committee have raised their prices as follows: Private lighting and vehicles, 3s. 9d. to 4s. 6d. per 1000 c.ft.; power, 3s. 3d. to 4s.; hospitals, 1s. 10½d. to 2s. 6d.; prepayment meters, 16 c.ft. for 1d. The Oldham Gas Committee have decided to increase the price from 3s. 5d. to 3s. 11d. per 1000 c.ft. Before the war, the charge was 2s. 5d.

Wages Question at Sheffield.—Meetings and correspondence have been taking place at Sheffield on the question of wages; and at one point the women went so far as to decide that, unless the advance of 5s. per week awarded by the Ministry of Munitions for women workers was conceded, and included in their wages last Friday, they would cease work. Subsequently, however, it was agreed at a full meeting that they should withdraw the strike threat, and await the decision regarding the award to the men. The meeting was then adjourned for a week. In the meantime, the District Secretary (Mr. C. H. Blackburn) was to communicate with Sir George Askwith and Mr. Will Thorne, M.P., as well as with the Directors of the Gas Company, informing them that, unless something was done by the 25th inst., the officials could not take the responsibility for what might happen. Sheffield gas workers have already been conceded advances granted in the engineering industry of 23s. 6d. weekly, and the 12½ p.ct.

Fuel Overseers and Removals.—Doubts having arisen as to the position under the Household Fuel and Lighting Order of persons removing at the September quarter, it has been officially notified that, when the occupier of any premises is about to remove, he must give notice of his removal and of the address to which he is removing to his present local Fuel Overseer. The local Fuel Overseer will recall the certificate under which the householder obtains his coal, gas, and electricity, and will satisfy himself that the person who removes has not exceeded his allowance for the period of the time he has occupied the house. If he has done so, it will be deducted from his allowance at his new premises. On Sept. 30 there may be some cases where no certificate has been issued, owing to the Order being in the early stages. The local Fuel Overseer will, if the removal is out of his district, forward particulars to the local Fuel Overseer of the district in which the new premises are situated. A new requisition will have to be submitted for the unexpired portion of the twelve months to July 1 next, or for twelve months clear if the application is made before Sept. 30. Failure to give notice of removal is an offence under the Order; and a new occupier may be required to afford evidence to the local Fuel Overseer of his district that the provisions of this portion of the Order have been complied with.

STOCK MARKET REPORT.

THERE was not much change last week in the general run of things on the Stock Exchange from what they had been in the week before. The opening was decidedly dull, and markets for the most part were very sluggish. The holiday season probably is most to blame for this; for it seems to be this year in course of protraction beyond the usual extent, and attendance is frequently meagre. There was no factor outside calculated to repress animation; for the history of the war at all points of contact was all that could be desired, and more than we had a right to expect. Thanks to this, the tone increased in cheerfulness as the week progressed, and finished at its best.

In the gilt-edged market, Home Government issues did well on the whole. Consols receded slightly from their advanced point; but War Loans were well supported, and closed firm. Home Rails could not count on much support, owing to labour troubles.

The Foreign Market had some good points. French Loans maintained firmness—another is on the eve of issue—Dutch, Swedish, and Greek were steady, and there was some inquiry for Russian. Business in the Miscellaneous Market was fairly brisk; but sales to realize profits checked the advance of recent rises in many lines. Rubber made some recovery, on a report that the Government are coming to its aid in the matters of export duty and war tax. The investor in Gas hearing this may marvel why that faithful servant of the State should receive such different treatment.

Business in the Gas Market—if we exclude one undertaking for a moment—was quieter than ever. Only seven others were touched at all, and several issues contributed but a single transaction apiece. It is gratifying to note, however, that, in spite of this condition of torpor, the tendency was quite firm, and the prices marked for bargains were almost the same as in the previous week. Imperial Continental—left last for notice—had a good recovery, and was freely dealt in at figures ranging from 105¼ on Monday to 112 on Friday; the quotation rising 4.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 64, 64½, 64⅝, 64¾, ditto preference 67, 67⅛, Imperial Continental 105⅜, 107⅛, 108, Monte Video 9½, Primitiva 36s., 36s. 3d., ditto preference 58s., South Suburban 70. On Tuesday, Continental Union 43, Gas Light ordinary 64, 64⅜, 64⅞, ditto preference 68, Imperial Continental 108, 108⅛, 109, 110, 111, Primitiva 35s., 37s., ditto preference 56s., 56s. 3d., 57s., Sheffield "B" 170, South Metropolitan 66, South Suburban, West Kent, 62½. On Wednesday, Gas Light ordinary 64, ditto preference 67, 68, Imperial Continental 108, 109⅜, 110, 110¾, 111, 111⅛, Primitiva 35s., ditto preference 56s., South Metropolitan 65, 65⅛, 65⅜. On Thursday, Gas Light ordinary 64⅜, 65, Imperial Continental 109, 110, 110⅛, 111, 111⅛, 112, ditto debenture 70⅜, Monte Video 9¾, Primitiva 36s., 36s. 6d., 36s. 9d., 37s., ditto preference 58s., South Metropolitan debenture 55. On Friday, Continental Union preference 66⅛, Gas Light ordinary 64¼, 64½, 64⅝, Imperial Continental 110, 110⅛, 111¼, 112, South Metropolitan 65, 65⅛, Wimbledon 68.

In the Money Market, rates hardened materially in response to a sharp demand. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55–60	..
1,551,868	"	April 8	2½	4⅜%	Alliance & Dublin Ord.	59–64	58–58	..
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76–79	62–67	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞–6⅜	5–5½	..
50,000	10	Feb. 26	16	11%	Bournemouth Gas and Water — 10 p.c.	29–30	20–22	..
383,110	10	"	7	7%	Bournemouth Gas and Water — B 7 p.c.	15–15½	10–11	..
115,000	10	"	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13½–14	9–9½	..
159,740	—	—	—	4%	Bournemouth Gas and Water — 4 p.c. Deb.	..	66–68	..
992,045	Stk.	Feb. 26	14	4⅜%	Brentford A Consolid.	261–266	73–76	..
784,930	"	"	11	4⅜%	Do. B New	204–209	65–68	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109–111	77–82	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91–93	62–64	..
217,380	"	Feb. 26	11	8¾%†	Brighton & Hove Orig.	208–218	135–140	..
244,200	"	"	8	5¾%†	Do. A Ord. Stk.	154–159	95–100	..
580,000	20	Mar. 26	12½	22/6	British	44–45	30½–31½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88–90	64–66	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85–87	50–53	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½–2½	3⅜–4½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4–6	7–8	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	60–65	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	79–81	..
1,513,280	"	Feb. 12	5/9/4	36/-	Commercial 4 p.c. Stk.	106–108	56–61	..
560,000	"	"	5½	30/-	Do. 3½ p.c. do.	103–105	53–58	..
475,000	"	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½–71½	51–53	..
800,000	"	"	4	—	Continental Union Ltd.	76–79	48–48	43
200,000	"	"	7	—	Do. 7 p.c. Pref.	115–118	65–70	66½
278,400	—	—	—	10½%	Croydon B and C 7 p.c..	..	140–150	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	6⅛%	Derby Con. Stk.	123–125	95–100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102–104	80–83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½–18	11–12	..
16,298,975	Stk.	Feb. 10	4/17/4	29/4	Gas Light and Coke — 4 p.c. Ord.	98–102	64–66	64–65
2,600,000	"	"	3¼	3⅛%	Gas Light and Coke — 3⅛ p.c. max.	76–79	52–54	..
4,062,235	"	"	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96–99	66–68	67–68
4,674,850	"	June 11	8	8%	Gas Light and Coke — 3 p.c. Con. Deb.	72½–74½	54–56	..
130,000	"	"	10	10%	Gas Light and Coke — 10 p.c. Bonds	..	..	..
258,740	"	Mar. 12	5	2¾%	Hastings & St. L. 3½ p.c.	87–89	45–50*	..
70,000	10	April 29	11	8%	Hongkong & China, Ltd.	16½–16⅝	7–8	..
86,600	—	—	—	9½%	Hornsey 7 p.c..	..	112–117*	..
131,000	Stk.	Mar. 12	7½	6½%	Ilford A and C.	151–154	88–93*	..
65,780	"	"	6⅜	4⅜%	Do. B	115–118	68–73*	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92–94	62–65	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150–160	109–114	105½–112
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84–86	70–72	70⅜
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119–121	92–97*	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A B	211–213 146–148	82–84	..
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71–73	..
75,000	5	June 11	6	3%	Malta & Mediterranean	4½–4⅝	3½–3⅝	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99–101	88–99	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½–12	8⅝–9½	9½
1,875,892	Stk.	July 29	4½	3⅛%	Newcastle&Gatsh'd Con.	98½–99½	64–66	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	83–88	59–61	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c.	14–16	9½–10½*	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	102–104	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½–7⅝	3–4	..
60,000	50	Feb. 26	18	9%	Porisea, Island B	128–131	78–83	..
100,000	50	"	12	8%	Do. C	118–121	73–78	..
52,000	50	"	10	6%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½–6	1⅜–1⅞	35/–37/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝–5	2⅝–3	£6/–58/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91–93	75–77	..
—	—	—	—	5%	Do. " " 1911	..	50–55	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85–87	55–60	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½–11	7½–7⅝	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	4⅞–49	40–42	..
185,000	Stk.	Mar. 12	10	10%	Sheffield A	228–234	..	..
209,984	"	"	10	10%	Do. B	223–234	170–173	170
528,500	"	"	10	10%	Do. C	220–222	..	..
90,000	10	May 28	9	6/-	South African.	10½–11½	10½–11½	..
8,609,895	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Ord.	111–113	65–67	65–66
250,000	"	July 12	—	5%	Do. Pref.	..	91–93	..
1,895,445	"	July 10	8	8%	Do. 3 p.c. Deb.	72½–74½	53–55	55
234,320	"	Feb. 26	8½	6%	South Shields Con. Stk.	157–159	118–119	..
952,795	"	"	6	3½%	S'th Suburb'n Ord. 5 p.c.	114–116	69–71	70
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110–112	73–75	..
135,000	—	—	—	3½%	Do. West Kent	..	..	62½
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116–118	83–85	..
647,740	"	May 14	5	3%	Southampton Ord.	99–102	68–71	..
120,000	"	Feb. 12	7½	5½%	Tottenham A 5 p.c.	135–138	88–93	..
783,275	"	"	6	4%	Tottenham B 3½ p.c.	115–117	64–66	..
181,255	"	June 26	4	4%	Tottenham 4 p.c. Deb.	87–89	61–63	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	45–50	..
235,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½–109½	87–88	..
80,000	"	Feb. 26	8⅜	63/9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c..	151–156	88–93	..
255,686	"	"	6⅜	48/9	Do. B 3½ p.c.	129–134	68–73	..
108,075	"	"	5/17/8	44/7½	Do. C 3½ p.c.	110–115	68–73	..
353,000	"	"	6⅜	42/6	Wimbledon 5 p.c.	117–122	68–73	68
98,000	"	"	6⅜	48/9	Epsom 5 p.c.	121–126	68–73	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66–69	48–51	..

* Ex Div. † Next Dividend will be at this rate.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS MANAGER. Burgh of Falkirk.
WORKING MANAGER. Bingham Gas Company. Applications by Sept. 30.
GAS ENGINEER AND MANAGER. Newtownards Urban District Council. Applications by Oct. 5.
GAS-WORKS CHEMIST. Wigan Corporation. Applications by Sept. 30.
CHEMIST AND ASSISTANT. No. 6501. Applications by Oct. 7.
JUNIOR CHEMIST. 6506.

Appointments, &c., Vacant (*Continued*).

JUNIOR ASSISTANT CHEMIST (in Tar-Works Laboratory). No. 6503.
SUPERINTENDENT OR GENERAL FOREMAN. Aldershot Gas, Water, and District Lighting Company.
COKE-OVEN SUPERINTENDENT. Saltley Gas-Works, Birmingham.
RETORT-HOUSE FOREMAN. No. 6505.
RETORT-HOUSE FOREMAN. Stretford Gas Company.
TIMMAN. No. 6504.

Appointments, &c., Wanted.

ENGINEER, &c. (Discharged Officer). No. 6491.
ENGINEER AND MANAGER OR ASSISTANT. No. 6498.

Books for Sale.

"KING'S TREATISE ON COAL GAS." Offers to No. 6507.

Plant for Sale.

METER. William Dixon, Ltd., Glasgow.

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Sept. 18, 1918.

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H. MCCARTNEY,
Clerk to the Council.

Town Hall,
Newtownards,
Sept. 9, 1918.

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W. H. TYRER.

Town Clerk's Office,
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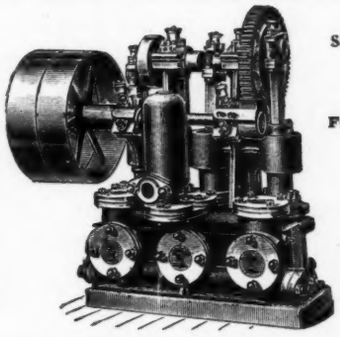

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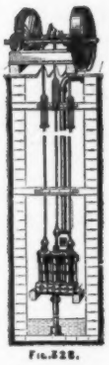

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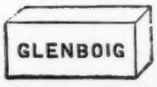
TRADE 

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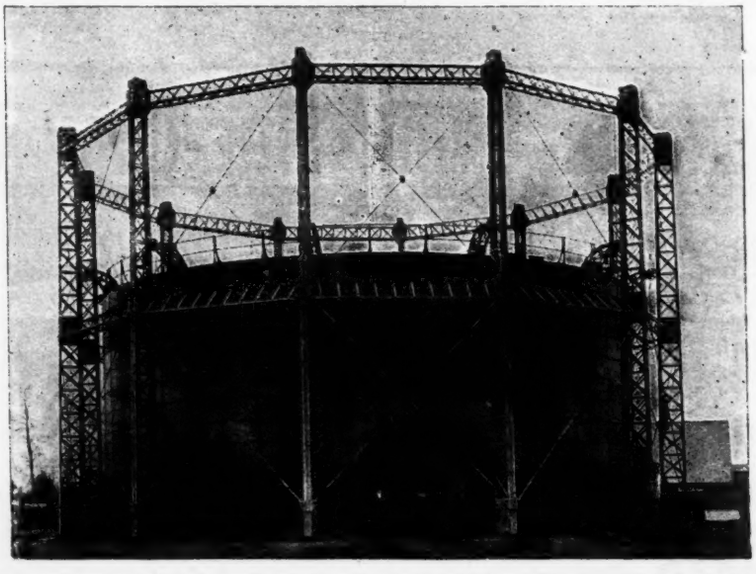

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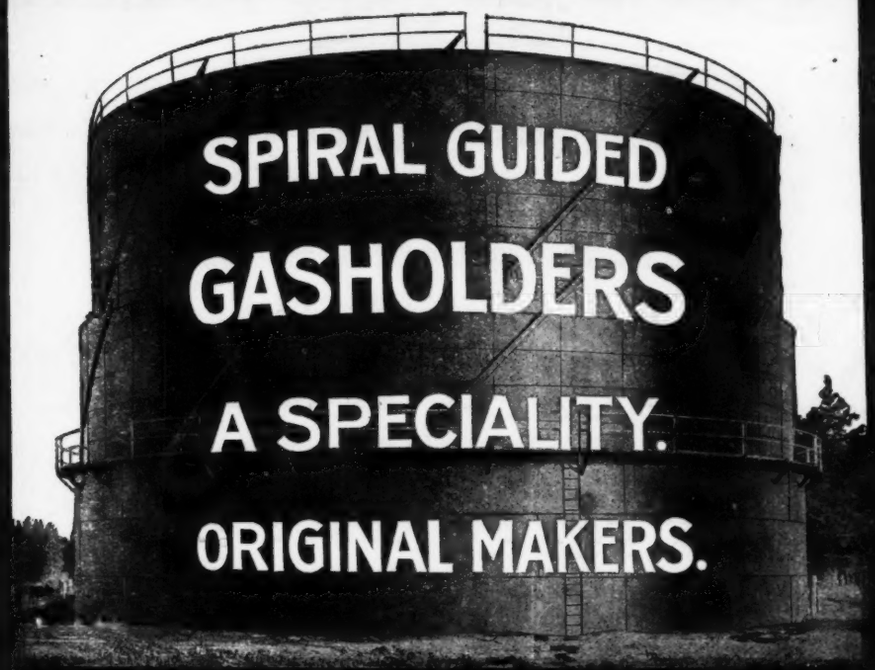

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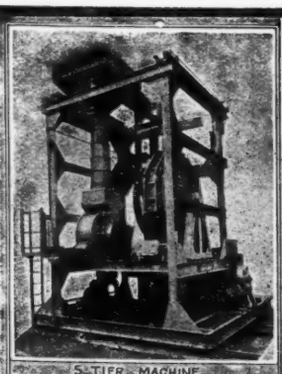
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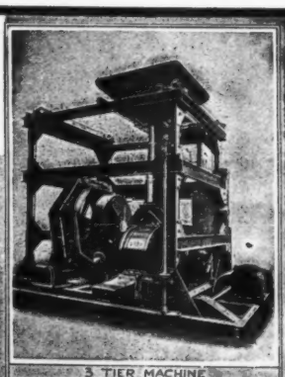
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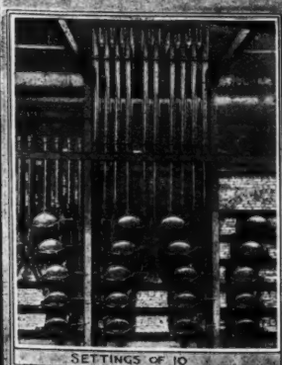
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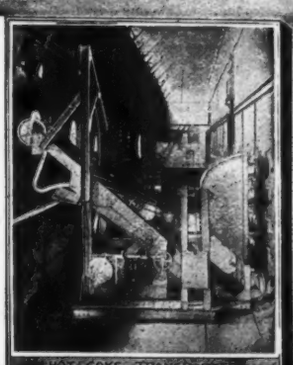
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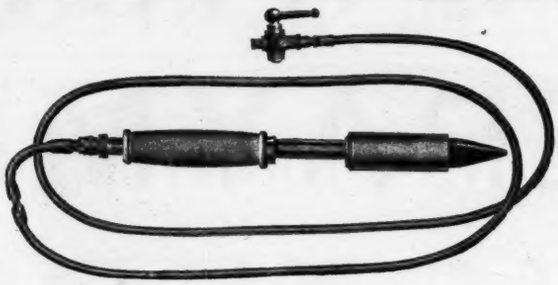

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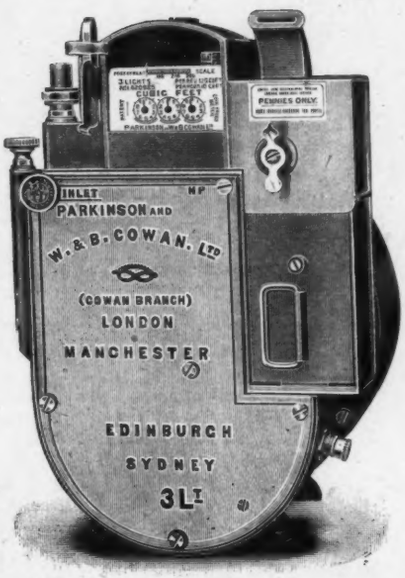

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